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WILDLIFE STUDY OF THE PROPOSED LIBBY REREGULATION DAM AREA WITH SPECIAL EMPHASIS ON BORROW SITES

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MONTANA DEPARTMENT OF FISH, WILDLIFE & PARKS
ECOLOGICAL SERVICES DIVISION

IN COOPERATION WITH U.S. ARMY CORPS OF ENGINEERS
Contract No. DACW67-79-C-0039

By

Richard DeSimone

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INTRODUCTION

A four-season survey of wildlife along the portion of the Kootenai River between Libby Dam and Libby, Montana was designed to increase our knowledge of wildlife use of riparian habitat. The primary objective of the study was to determine the diversity and occurrence of terrestrial wildlife in the proposed reregulating dam reservoir area with specific emphasis upon borrow sites. In addition, the study was conducted to assess potential wildlife impacts as a result of the developments. This study stems from a determination by the Montana Department of State Lands that existing wildlife information for the project was inadequate for the issuance of an open-cut mining permit to the U. S. Army Corps of Engineers for the development of borrow sites in relation to construction of the Libby reregulation dam project.

The importance of riparian ecosystems to our nation's wildlife has been recognized for many years. The majority of wildlife species in North America inhabit riparian ecosystems (Hubbard 1977) and there is no other habitat component upon which fish and wildlife are so dependent (Ohmart et al. 1977). The importance of riparian ecosystems to wildlife was the theme of a symposium in Tucson, Arizona (Johnson and Jones 1977) and was discussed at length at a symposium in Atlanta, Georgia (Johnson and McCormick 1978).

In Montana, studies have shown that the highest abundance and diversity of nongame birds occur in riparian habitats along the Missouri River (Walchek 1970), Yellowstone River (Swenson 1978), and the Kootenai River (Joslin 1978). Other studies along the Yellowstone River have shown the importance of riparian habitat to waterfowl (Hinz 1977) and furbearing mammals (Martin 1977). Although information concerning wildlife use of riparian ecosystems is available, we lack information on the extent to which riparian species can tolerate habitat disturbance. A greater understanding of the nature of species dependence upon riparian habitats is necessary to serve as a basis for resource planning, management and mitigation.

The study was conducted from January 1979 through December 1979 with additional ungulate data collected during February 1980. The extensive study area included the Kootenai River Basin from Libby Dam to Libby. Intensive study was conducted in five areas which included three borrow sites which occur outside the proposed reservoir boundary, one borrow area which would be inundated by the proposed reservoir and one additional area which is representative of bottomland habitats which would be inundated by the proposed reservoir. Funding was provided for the study by the U. S. Army Corps of Engineers (Contract DACW67-79-C-0039).

STUDY AREA

Location

The proposed Libby reregulation dam and reservoir is located on the Kootenai River. The Kootenai River (Kootenay in Canada) originates in British Columbia and flows south through the Rocky Mountain Trench. The Kootenai River enters Montana near Eureka, swings west at the Jennings Site, goes past Libby and Troy and enters Idaho, where it flows north into British Columbia once again and empties into Kootenay Lake and eventually drains into the Columbia River (Figure 1).

The Kootenai River is 485 miles long and approximately one-third of it lies in the United States. About 100 miles of the Kootenai River occurs in Montana. Libby Dam, located 17 miles upstream of Libby, creates Lake Koocanusa which impounds 48 miles of the Kootenai in Montana and backs water up for 42 miles into British Columbia. The Kootenai River has an average stream gradient of 0.1% with the river dropping approximately 5 feet per mile. The average annual discharge at Libby between 1911 and 1971 was 12,070 cubic feet per second.

The Kootenai River Basin in Montana is characterized by high, rugged, forested mountain ranges separated by narrow, linear valleys (Figure 2). Elevations in the study area vary between 2,100 feet at the valley floor to over 5,000 feet on mountain ridges. Important tributaries of the Kootenai between Libby Dam and Libby are Alexander Creek, Dunn Creek, Fisher River, Rainy Creek and Libby Creek (Figure 4).

Climate

The climate of the Kootenai River Basin is a combination of the west coast marine and continental climate. Information from the U. S. Forest Service Libby Ranger Station at Libby indicates that the area receives an average annual precipitation of 19.4 inches with approximately 50% occurring as snow. Annually the maximum precipitation occurs during the November to January period. The average annual temperature is 45.1 F with January the coldest month (average 22.4 F) and July (average 67.0 F) and August (average 65.3 F) the warmest.

Project Description

The Libby reregulating dam would be located at river mile 208.9, 10 miles downstream of the main Libby Dam and about 17 miles upstream of the town of Libby (Figure 3). The reregulating dam would increase the peaking capabilities of Libby Dam by means of a fluctuating reservoir, in effect reregulating downstream discharges so that they do not exceed the established criteria. The dam is an earth and rockfill structure with a concrete spillway/powerhouse structure with an overall length of 2,145 feet and a height of 75 feet above the existing streambed. The total reservoir volume would be 37,500 acre-feet at maximum elevation and would have a surface area of 1,350 acres. The reservoir is

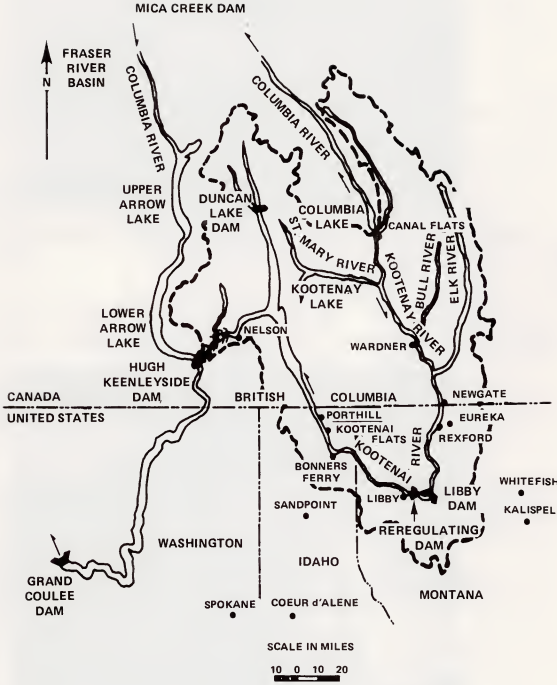

FIGURE 1. Kootenai River Basin in the United States and Canada.

FIGURE 2. View of a portion of the Kootenai River Basin between Libby and Libby Dam.

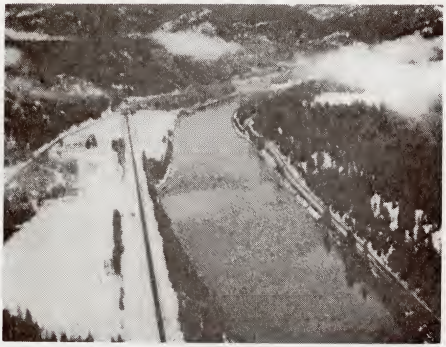

FIGURE 3. Site of the proposed Libby reregulation dam (RM 208.9) on the Kootenai River.

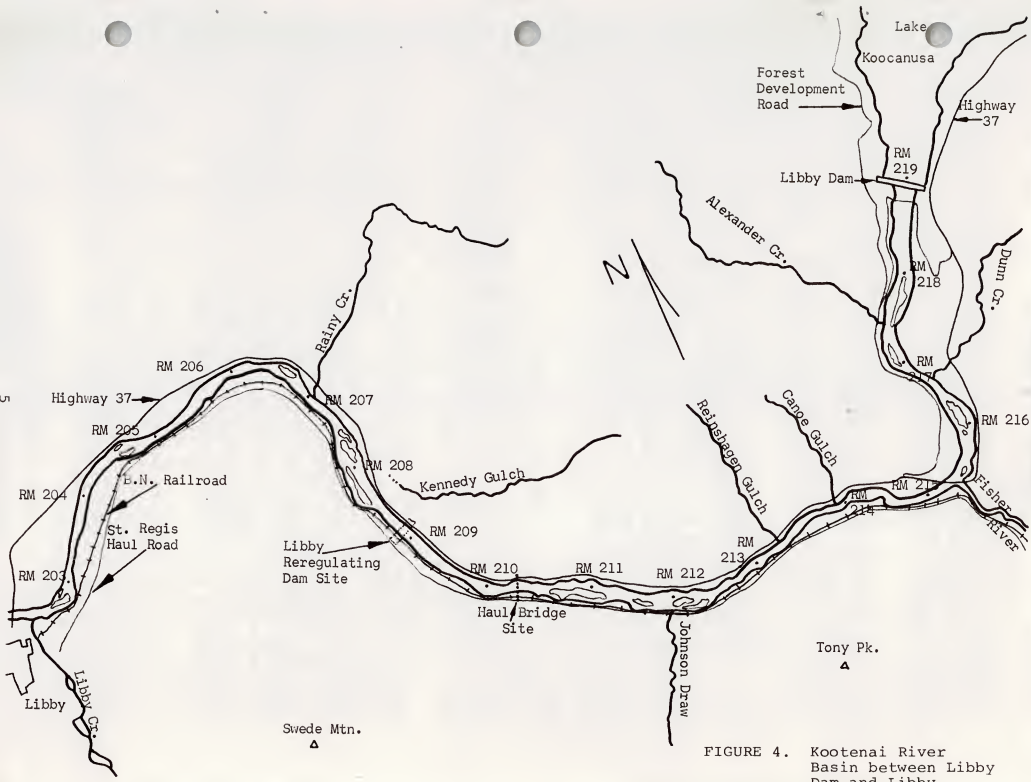

FIGURE 4. Kootenai River Basin between Libby Dam and Libby.

designed to fluctuate a maximum of 30 feet from elevation 2100 to 2130 MSL; however, under normal operating conditions, the weekly fluctuations would be about 4-5 feet during the summer and about 12-15 feet during the winter. The reservoir would have an average width of about 1/4 mile and a shoreline of 21 miles.

The reservoir pool would inundate approximately 1,300 acres of land. In addition, approximately 270 acres will be affected from relocation of 8.8 miles of Burlington Northern Railroad, 7 miles of Montana State Highway 37, 0.5 miles of Forest Development Road and and telephone cable and powerlines. Several hundred acres would also be affected from development of the borrow sites.

Approximately 9.7 million cubic yards of common and rock borrow material are needed in the reregulating dam project for concrete and paving aggregates, for various zones in the dam embankment and for roads and railroad embankments. The sources of the borrow material are shown in Figure 5. Additional information about the borrow sites is given in U.S. Army Corps of Engineers, Materials Utilization Study (1977). Borrow material occurring in the proposed reservoir area would supply a portion of the amount needed with the remaining sources derived from areas outside of the reservoir water line. These include sites at the Fisher River, Kennedy Terrace and an area across the river from the mouth of Rainy Creek.

Vegetation

Extensive Study Area

The extensive study area during this study included the Kootenai River and associated habitat between Libby Dam and Libby. Vegetation occurring in the Kootenai River Basin between Libby Dam and Libby may be broadly separated into three types: south slope habitats, north slope habitats and bottomland habitats.

South slope habitats occurred north of the Kootenai River and were generally open with scattered stands of ponderosa pine (Pinus ponderosa), and a limited amount of Douglas-fir (Pseudotsuga menziesii) (Figure 8). Understory species were primarily bitterbrush (Purshia tridentata), western service berry (Amelanchier alnifolia) and chokecherry (Prunus virginiana). Other shrubs occurring included creeping Oregon grape (Berberis repens), white spiraea (Spiraea betulifolia) and redstem ceanothus (Ceanothus sanguineus). Major forbs found were yarrow (Achillea millefolium), arrowleaf balsamroot (Balsamorhiza sagittata), lupine (Lupinus spp.), and dogbane (Apocynum spp.). Grasses were characterized by bluebunch wheatgrass (Agropyron spicatum), Idaho fescue (Festuca idahoensis) and rough fescue (Festuca scabrella) with pinegrass (Calmagrostis rubescens) and cheatgrass (Bromus tectorum) also present.

North slope habitats south of the Kootenai River were usually densely timbered primarily with Douglas-fir. Western larch (Larix occidentalis) and lodgepole pine (Pinus contorta) also occurred and grand fir (Abies grandis) was present at higher elevations. Understory shrubs consisted of mountain maple (Acer glabrum), mockorange

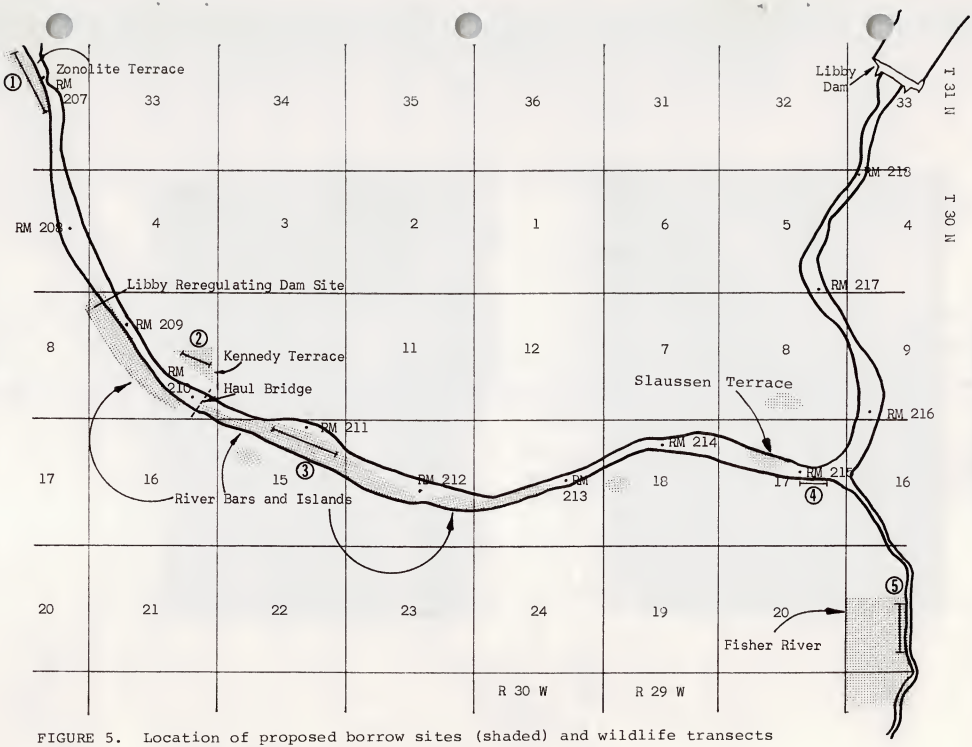

FIGURE 5. Location of proposed borrow sites (shaded) and wildlife transects (circled numbers) along the Kootenai River.

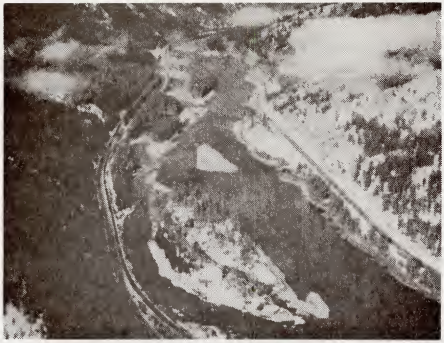

FIGURE 6. River islands located between river mile 210.5 and 212.5 on the Kootenai River.

FIGURE 7. River island located at river mile 216.1 on the Kootenai River.

FIGURE 8. Ungulate winter range north of the Kootenai River.

FIGURE 9. Bottomland habitat in the vicinity of river mile 215.1 on the Kootenai River in which a wildlife transect was located.

(Philadelphus lewisii), ninebark (Physocarpus malvaceus), snowberry (Symphoricarpos spp.), Oregon grape, kinnikinnick (Arctostaphylos uva-ursi), blue huckleberry (Vaccinium globulare), white spiraea, and ocean spray (Holodiscus discolor). Forbs present included heartleaf arnica (Arnica cordifolia), Sego lily (Calochortus apiculatus), queencup beadlily (Clintonia uniflora), as well as lupine and yarrow. The predominant grass was pinegrass.

Bottomland habitats (within the floodplain of the proposed reservoir) were divided into bottomland coniferous forests and islands, bottomland deciduous forests and islands, meadows and gravel bars, and gravel islands. The bottomland coniferous forests were present throughout the river bottom. Islands on the Kootenai River which were dominated by coniferous overstory included those occurring at River Mile (RM) 216 (Figure 7) and between RM 210.5 and RM 212.5 (Figure 6). Dominant overstory species were Douglas-fir, western red cedar (Thuja plicata) and larch. Understory species included: Oregon grape, Rocky Mountain juniper (Juniperus scopulorum), Canadian buffaloberry (Shepherdia canadensis), mountain maple, red dogwood (Cornus stolonifera), service berry and snowberry.

Bottomland islands which had a predominant deciduous or broadleaf overstory included those occurring at RM 217.5, RM 207.7 and RM 202.5. Deciduous overstory also occurred in numerous areas along the river including the area south of RM 215.2 (Figure 9). The dominant overstory species was black cottonwood (Populus trichocarpa). In some areas alder (Alnus spp.), birch (Betula spp.) and willow (Salix spp.) also constituted the overstory. Important understory species were dogwood, rose (Rosa spp.), chokecherry, gooseberry (Ribes spp.), snowberry, service berry, alder and willows.

Meadow type habitats occurred in several areas along the river. Some of these areas occurred naturally although many had been cleared. In the site of the proposed reregulation dam reservoir, meadow type habitats occur west of RM 214.5, north of the river in the vicinity of RM 215 and 216; and west of the river between RM 208.5 and 209.5. Grasses occurring in these areas included wheatgrass, brome (Bromus spp.), and bluegrass (Poa spp.). Grasslands which were cut for hay occurred primarily between Rainy Creek and Libby.

Gravel bars and islands occurred throughout the Kootenai River between Libby Dam and Libby although a high percentage were found between the site of the reregulating dam and Libby Dam. Although gravel bars and islands are sparsely vegetated, they are vital habitat for numerous shorebirds, ducks and geese. These gravel areas are maintained in early successional stages through continued water level fluctuations. A variety of early successional shrubs, forbs and grasses occur on these areas and include: willow, yellow sweetclover (Melilotus officinalis), cocklebur (Xanthium strumarium), horsetail (Equisetum arvense), thistle

(Cirsium spp.), sedge (Carex spp.) and goldenrod (Solidago spp.). Gravel areas utilized by wildlife during the study included those occurring at RM 215.5 (Figure 10), RM 217.1 (Figure 11), RM 210.7 (Figure 12) and RM 215.1 (Figure 13).

Intensive Study Area

Five areas along the Kootenai River were chosen for intensive study. Three of these areas occurred on proposed borrow sites which would not be inundated by the reregulation reservoir, one was located on a borrow area which would be below the water line of the proposed reservoir, and an additional site was located at the mouth of the Fisher River which was characteristic of deciduous overstory habitats which would be inundated. Locations of these areas are given in Table 1 and shown in Figure 5. The numbers identifying these transects in Figure 5 are consistent with numbers used in the text.

1. Coniferous North Slope Transect. This transect occurred across the river from the mouth of Rainy Creek and was included on the Zonolite Terrace Borrow Site (Figure 14). The predominant overstory species of the areas was Douglas-fir with larch and ponderosa pine also occurring. The area is representative of the Douglas-fir/ninebark habitat type pinegrass phase (PSME/PHMA-CARU) according to Pfister et al. (1977). Important shrubs occurring at the site were Oregon grape, kinnikinnick and service berry. Other shrubs also present were ninebark, snowberry, rose, white spiraea, Rocky Mountain juniper, alder and western trumpet honeysuckle (Lonicera ciliosa). Forbs occurring in the area included lupine, yarrow, pussytoes (Antennaria spp.), pearly everlasting (Anaphalis margaritaceae), frigid milkvetch (Astragalus americanus), dogbane and lousewort (Pedicularis spp.). Grasses were primarily pinegrass, elk sedge (Carex geyeri) and western wheatgrass. A portion of the site was disturbed and included a refuse dump; several weed species occurred here including thistle, sweetclover and flannel mullen (Verbascum thapsus).

2. Coniferous South Slope Transect. This transect was located north of the site of the haul bridge (Figures 15 and 16) and is included on the Kennedy Terrace Borrow Site. This area was also identified as the PSME/PHMA-CARU habitat type. The dominant overstory species was Douglas-fir with ponderosa pine and larch also occurring. Important shrubs included ninebark, Oregon grape, ocean spray, white spiraea and snowberry. Forbs included yarrow, lupine, dogbane, starry Solomon's seal (Smilacina stellata), with sweetclover present in disturbed areas. Dominant grasses were pinegrass and Idaho fescue, rough fescue and elk sedge.

3. Coniferous Bottomland Transect. This transect was located on a river island (Figure 17) which is in the vicinity of RM 211. The area is included on the river bars and islands which would be used as a source of borrow material and would be inundated by the proposed project. The area is characteristic of several

Table 1. Information concerning the location of 5 areas of intensive study on the Libby reregulation dam study area.

Transect Name	Location	Located near River Mile	Elevation (feet)	Comments
Coniferous north-slope	T31N,R30W, S32, NW	207.0	2250	Zonolite Terrace Borrow Site
Coniferous south-slope	T30N,R30W S9, SE	210.0	2250	Kennedy Terrace Borrow Site
Coniferous bottomland	T30N,R30W, S15, NE	211.0	2100	Representative River Island Borrow Area
Deciduous bottomland	T30N,R29W, S17, NESE	215.2	2100	Representative area which would be inundated by the proposed project
Mixed Coniferous-Deciduous bottomland	T30N,R30W, S21, SE	-	2150	Fisher River Borrow Site

FIGURE 10. Gravel island in the vicinity of river mile 215.5 on the Kootenai River.

FIGURE 11. Gravel island in the vicinity of river mile 217.1 on the Kootenai River.

FIGURE 12. Canada goose utilizing a gravel area in the vicinity of river mile 210.7 on the Kootenai River.

FIGURE 13. Gravel area in the vicinity of river mile 215.1 on the Kootenai River.

FIGURE 14. Proposed Zonolite Terrace Borrow site in the vicinity of river mile 207 on the west side of the Kootenai River.

FIGURE 15. Proposed Kennedy Terrace Borrow site and the site of the haul bridge on the Kootenai River.

FIGURE 16. Kennedy Terrace Borrow site north of river mile 210 on the Kootenai River.

FIGURE 17. River island at river mile 211 on the Kootenai River on which a wildlife transect was located.

coniferous islands occurring in the project area as well as coniferous forests occurring adjacent to the river. The area is representative of the western red cedar/queencup beadlily habitat type, wild sarsaparilla phase (THPL/CLUN-ARNU). The overstory was dominated by western red cedar and Douglas-fir although the west end of the transect consisted mostly of red cedar while the rest was a mixture of cedar and Douglas-fir. Other overstory species included cottonwood, larch and ponderosa pine. Important shrubs included maple, Oregon grape, service berry, snowberry and buffaloberry. Other shrubs also occurring at the site included red dogwood, juniper, rose, chokecherry, white spiraea and willow. Forbs included queencup beadlily, wintergreen (Pyrola sp.), violet (Viola sp.), and bedstraw (Galium sp.). Grasses included pinegrass and western wheatgrass.

4. Deciduous Bottomland Transect. This transect was located in the vicinity of RM 215.1 (Figure 9) along the south bank of the Kootenai at the mouth of the Fisher River. This area is representative of several deciduous tree-dominated islands and areas along the Kootenai River. The primary overstory species was cottonwood, although stands of alder occurred on the west end of the transect and stands of willow on the north edge. A few ponderosa pine, Douglas-fir, and birch also occurred. Common shrubs included service berry, dogwood, chokecherry, rose, gooseberry, and buffaloberry. A variety of forb and grass species occurred at the site although the dense shrub understory resulted in a low density of forbs and grasses.

5. Mixed Coniferous-Deciduous Bottomland Transect. This transect was located approximately 2 miles up the Fisher River from its mouth (Figure 18). The area was included on the east portion of the Fisher River Borrow Site. The transect included a portion of the old Fisher River channel. The Fisher River was diverted after the relocation of the Burlington Northern Railroad and the new channel is located on the east side of the transect. This area combined characteristics of both the deciduous and coniferous transects. Overstory was primarily Douglas-fir although cottonwood, larch and ponderosa pine also occurred. Shrub species included willow, alder, buffaloberry, chokecherry, service berry, rose and maple.

METHODS

A variety of methods were used to record all mammalian and avian species observed in the study area. The relative abundance and distribution of waterfowl utilizing the Kootenai River from Libby Dam to Libby was determined by monthly surveys. During surveys the Kootenai River was divided into five sections: section 1 included Libby Dam to the Fisher River (RM 218.9 to 216.6); section 2 from the Fisher River (RM 216.6) to RM 214.7; section 3 from RM 214.7 to the site of the reregulation dam (RM 208.9); section 4 from RM 208.9 to Rainy Creek (RM 206.9) and

FIGURE 18. Portion of the proposed Fisher River Borrow site on which a wildlife transect was located.

section 5 from RM 206.9 to the Highway 37 bridge at Libby (RM 201.8). Fixed-wing aerial surveys were conducted from January through June; helicopter surveys were conducted during March, June, November and December; and jet boat surveys were conducted from June through October. The breeding pair census for ducks followed the techniques outlined in Dzubin (1969). River islands and other habitat along the river were searched for waterfowl nests and broods. Duck broods were aged and duck brood production was estimated utilizing the procedure given in Gollop and Marshall (1954). Canada goose broods were aged according to Hanson (1967).

All bird species observed were recorded by date, location, group size and sex and age when appropriate. During the study the winter season spanned December through February; spring included March through May; summer included June through August; fall included September through November. Walking transects were established in five locations along the river (Table 1) which generally were representative of the various habitats present in the area. The location of these transects is shown in Figure 5. Each of the transects were walked during each season to determine wintering, migratory, breeding and yearlong use by species of birds. Percent frequency of occurrence was determined in each transect during each season for each species. It was determined by dividing the total number of stations where the species was present by the total number of stations times 100. The percent composition of each species observed at each transect was calculated by dividing the number of recorded individuals of a species

by the total number of birds observed on the transect and multiplying by 100. Percent composition was calculated for each transect during each season. In addition to transects information, all birds observed during river surveys and general reconnaissance were recorded. A composite percent composition was calculated for all birds observed during each season and is given in Appendix Table 1. Nest success, productivity and fledging success was determined for ospreys utilizing the area during helicopter flights in May and June and fixed-wing flights in May and July. A ruffed grouse drumming count route was conducted in May following techniques given in Petraborg et al. (1953).

Ungulate use of the study area was determined during aerial and ground surveys. Ungulates observed on the winter range north of the Kootenai River between Alexander Creek and Rainy Creek (Figure 4) were recorded during helicopter surveys on 9 March 1979, and 18, 20 and 21 February 1980. Ungulates were recorded according to species, location, aspect, elevation, groups size; sex and age were recorded when possible. Ungulate observations were also recorded during general ground reconnaissance. Ungulate observations and sign were recorded on the five established transects during walking routes. A pellet group survey was conducted on each transect. The number of pellet groups were counted on 3 feet either side of the transect line, which ranged from 1,500 to 3,000 feet. These data were then recalculated to number of pellet groups per acre.

All mammals observed during aerial surveys and ground reconnaissance were recorded by date, species, location and groups size. Small mammal trapping (using snap traps) was conducted in six areas during September, generally following the procedures given in Calhoune (1948). Traplines were placed in the five established transects and an additional trapline was placed in a grassland habitat located along the south side of the river in the vicinity of the reregulating dam site. Traplines consisted of 20 stations, having 3 traps per station, spaced 50 feet apart and set for 3 nights which totalled 180 trap nights per trapline.

Black and white photographic prints and 35mm slides were taken of various habitats within the study area and of other interesting aspects of the study area. Wildlife literature pertinent to the study and existing information concerning wildlife of the area were reviewed.

RESULTS

Wildlife Use of Extensive Study Area

Ducks

In the portion of the Kootenai River studied, from Libby Dam to Libby, ducks utilized the river yearlong. The status, abundance and dates of observation of the 14 species of ducks observed during the study are given in Table 2. The total number of ducks observed during monthly surveys is illustrated in Figure 19 and is compared with the number of ducks observed during surveys conducted during 1976 and 1977 by Montana Department of Fish and

Table 2. Status, abundance and dates of observation of bird species observed on the Libby reregulation dam study area.

Common Name	Scientific Name	Status and Abundance 1/	Date Observed
Common loon	Gavia immer	fm-R	10/26
Western grebe	Aechmophorus occidentalis	fm-R	10/18
Great blue heron	Ardea herodias	S-C, W-U	EY
Canada goose	Branta canadensis	B-C	22 Feb-12 Oct also 9 Feb 80
Mallard	Anas platyrhynchos	B-A, W-A	EY
Gadwall	Anas strepera	fm-R	8/21
Pintail	Anas acuta	fm-R	8/21
Green-winged teal	Anas crecca	fm-U	8/21 - 10/26
Blue-winged teal	Anas discors	Sm-R,fm-U	3/9, 5/4-9/20
American wigeon	Anas americana	Sm-R,fm-R	4/5, 8/22-10/10
Northern shoveler	Anas clypeata	Sm-R	5/4
Wood duck	Aix sponsa	b-C	5/4-12/10
Lesser scaup	Aythya affinis	Sm-R	4/6
Common goldeneye	Bucephala clangula	W-A	1/23-5/22, 11/17-12/10
Barrow's goldeneye	Bucephala islandica	Sm-R	5/5
Harlequin duck	Histrionicus histrionicus	Sm-R	6/11
Hooded merganser	Lophodytes cucullatus	Sm-U,fm-R	3/9-5/8,11/20
Common merganser	Mergus merganser	B-C,W-C	EY
Goshawk	Accipiter gentilis	fm-R	9/14
Cooper's hawk	Accipiter cooperii	fm-R	8/22
Red-tailed hawk	Buteo jamaicensis	S-U	4/6-10/26
Rough-legged hawk	Buteo lagopus	Sm-R,fm-R	5/4,8/21
Golden eagle	Aquila chrysaetos	fm-U	11/13-12/14
Bald eagle	Haliaeetus leucocephalus	W-C,Sm-C, fm-C	1/23-3/15, 9/20-12/14
Marsh hawk	Circus cyaneus	fm-R	11/13
Osprey	Pandion haliaetus	B-C	4/8-9/26
Merlin	Falco columbarius	fm-R	11/12
American kestrel	Falco sparverius	b-U	4/13-9/20
Blue grouse	Dendragapus obscurus	W-U,B-U	EY
Ruffed grouse	Bonasa umbellus	W-C,B-C	EY
Turkey	Meleagris gallopavo	Sm-R	4/11
American coot	Fulica americana	Sm-R,fm-U	6/11,10/18
Killdeer	Charadrius vociferus	B-C	3/9-10/18
Common snipe	Capella gallinago	Sm-R	5/10
Spotted sandpiper	Actitis macularia	B-C	5/23-8/21
Lesser yellowlegs	Tringa flavipes	fm-U	8/21
California gull	Larus californicus	b-C	4/7-11/17
Ring-billed gull	Larus delawarensis	fm-R	7/23
Rock dove	Columba livia	B-U,W-U	EY
Mourning dove	Zenaida macroura	B-C,W-C	EY
Great horned owl	Bubo virginianus	b-U,W-U	EY
Common nighthawk	Chordeiles minor	S-R	7/22
Vaux's swift	Chaetura vauxi	S-U	6/14-7/20
Rufous hummingbird	Selasphorus rufus	b-U	5/23-7/22
Belted kingfisher	Megaceryle alcyon	b-U	4/15-11/13

Table 2 (continued)

Common Name	Scientific Name	Status and Abundance 1/	Date Observed
Common flicker	Colaptes auritus	B-U	3/15-7/22, 12/14
Pileated woodpecker	Dryocopus pileatus	b-U,W-U	EY
Lewis' woodpecker	Asyndesmus lewis	S-R	6/26-7/19
Yellow-bellied sapsucker	Sphyrapicus varius	S-C	5/8-9/21
Hairy woodpecker	Dendrocopos villosus	b-U	2/21 -6/18
Downy woodpecker	Dendrocopos pubescens	b-U	3/15-7/22
Black-backed three-toed woodpecker	Picoides arcticus	w-R	2/9/80
Eastern kingbird	Tyrannus tyrannus	b-U	5/25-7/22
Flycatcher	Empidonax spp.	b-C	5/8-7/22
Violet-green swallow	Tachycineta thalassina	B-C	4/15-6/24
Rough-winged swallow	Stelgidopteryx ruficollis	b-C	5/23-7/20
Barn swallow	Hirundo rustica	b-C	6/22-9/20
Cliff swallow	Petrochelidon pyrrhonota	B-C	6/14-8/21
Gray jay	Perisoreus canadensis	fm-R	7/21,11/13
Steller's jay	Cyanocitta stelleri	fm-R	11/19-12/14
Black-billed magpie	Pica pica	w-U	1/25-2/23
Common raven	Carvus corax	b-C,W-C	EY
Common crow	Carvus brachyrhynchos	b-C,W-C	EY
Clark's nutcracker	Nucifraga columbiana	fm-R	10/26
Black-capped chickadee	Parus atricapillus	B-C,W-C	EY
Mountain chickadee	Parus gambeli	B-C,W-C	EY
Red-breasted nuthatch	Sitta canadensis	b-U,W-U	EY
Brown creeper	Certhia familiaris	b-U,W-U	EY
Dipper	Cinclus mexicanus	b-C,W-U	EY
Gray catbird	Dumetella carolinensis	B-U	5/24-7/20
American robin	Turdus migratorius	B-C	3/8-7/22
Varied thrush	Ixoreus naevius	Sm-C	4/6-5/9
Swainson's thrush	Catharus ustulatus	b-C	6/18-7/22
Veery	Catharus fuscescens	S-R	7/20
Mountain bluebird	Sialia currucoides	Sm-U	4/13,5/24
Townsend's solitaire	Myadestes townsendi	b-U	2/23-6/24
Golden-crowned kinglet	Regulus satrapa	b-C,W-C	EY
Bohemian waxwing	Bombycilla garrulus	w-C	1/24
Cedar waxwing	Bombycilla cedrorum	S-U	6/7-8/22
Northern shrike	Lanius excubitor	w-R	2/23
Starling	Sturnus vulgaris	b-U	4/6-7/20
Red-eyed vireo	Vireo olivaceus	b-C	5/23-7/22
Tennessee warbler	Vermivora peregrina	Sm-R	5/8
Yellow warbler	Dendroica petechia	B-C	5/8-7/22
Yellow-rumped warbler	Dendroica coronata	B-U	5/18-6/26
Townsend's warbler	Dendroica townsendi	Sm-R	5/22
Macgillivray's warbler	Oporornis tolmiei	b-U	5/7-7/20
Common yellowthroat	Geothlypis trichas	S-R	7/20
American redstart	Setophaga ruticilla	b-C	5/9-7/20
Red-winged blackbird	Agelaius phoeniceus	b-U	5/10-6/26
Brown-headed cowbird	Molothrus ater	B-C	5/9-6/24
Western tanager	Piranga ludoviciana	b-U	5/24-7/20

Table 2 (continued)

Common Name	Scientific Name	Status and Abundance[1/]	Date Observed
Black-headed grosbeak	Pheucticus melanocephalus	b-C	5/24-7/20
Lazuli bunting	Passerina amoena	Sm-R	5/25
Evening grosbeak	Hesperiphona vespertina	S-U	6/7-7/20
Cassin's finch	Carpolacus cassinii	Sm-R	5/23
Pine grosbeak	Pinicola enucleator	Sm-U	3/8,4/6
Pine siskin	Spinus pinus	W-A,B-C	1/24-7/21
Red crossbill	Loxia curvirostra	W-C,Sm-C	2/22-4/6
Rufous-sided towhee	Pipilo erythrophthalmus	Sm-R	5/10
Dark-eyed junco	Junco hyemalis	W-C,b-U	1/24-7/22
Chipping sparrow	Spizella passerina	b-C	5/9-7/22
Song sparrow	Melospiza melodia	W-C,B-C	EY

1/ Status - B: breeds on area (nest or dependent young);
b: probably breeds on area (territorial males or pairs located);
Sm: spring migrant;
fm: fall migrant;
S: summers on area (no evidence of breeding);
W: over winter on area (present each winter month);
w: transient in winter (few records)

Abundance - A (abundant): found in large numbers in appropriate habitats;
C (common): found in moderate numbers in appropriate habitats;
U (uncommon): present in appropriate habitat, but in small numbers;
R (rare): few sightings

Dates Observed: EY: observed during all seasons.

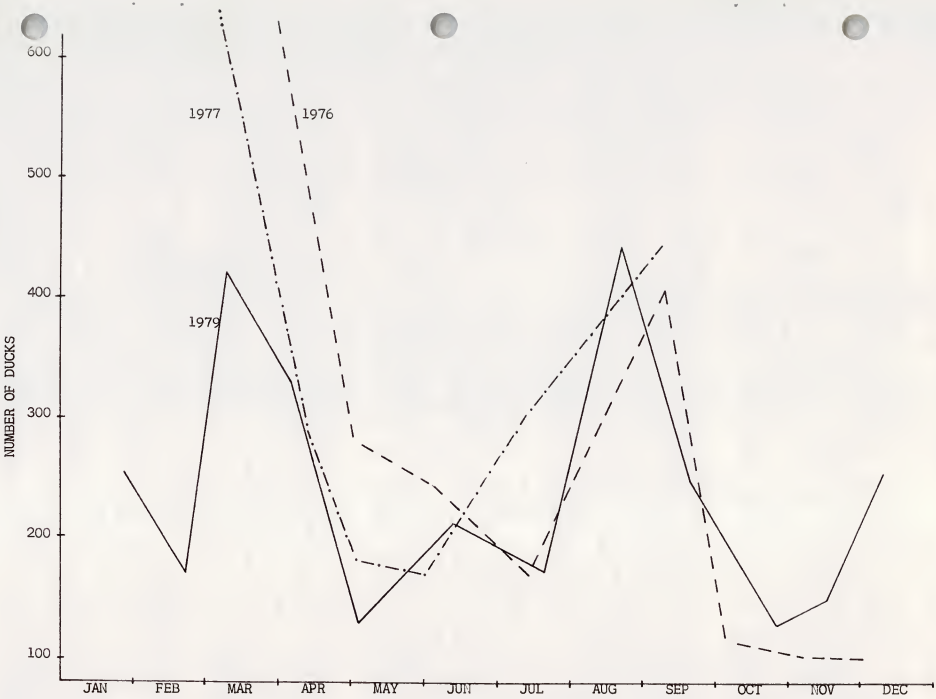

FIGURE 19. Number of ducks observed during monthly surveys in 1979 and number of ducks observed during surveys in 1976 and 1977 on the Kootenai River between Libby Dam and Libby.

Game personnel (unpublished data). Overall peak numbers of ducks were observed during March and August. Peak numbers of ducks during 1976 and 1977 were observed during March when over 600 were seen. The highest number of ducks during 1979 was 442 on 21 August and 420 on 9 March. In other parts of Montana, the peak in duck numbers during fall migration occurs during October and November. On the Kootenai River, the few ducks observed during fall is probably related to large releases of water from Libby Dam. The turbulent nature of the river during high releases from Libby Dam makes the river less attractive as a resting spot for migrating ducks.

Yearlong the Kootenai supported approximately 250 ducks per survey between Libby Dam and Libby. The yearlong highest number of ducks per mile was recorded in the first section of the river (Table 3) between Libby Dam and the Fisher River. This area was particularly attractire to large groups of mallards during spring and fall migration. The reason ducks selected this section of the river is probably related to the river being wider in this area which offers a slower and large body of water. Approximately 60% of all ducks observed during surveys occurred between Libby Dam and the site of the reregulation dam.

1. Mallards. Observations of mallards accounted for 50% of all ducks observed. Data collected during this study and information from river surveys during 1976 and 1977 indicate that mallards were the most common duck during all seasons except winter when common goldeneyes were the most abundant. The monthly census of mallards is given in Table 4. Mallards did not indicate a distinct preference for any of the five sections of river studied although during migration relatively large groups of mallards (25 to 100) were noted in river sections 1 and 5. These portions were comparatively wider and more attractive to migrating ducks.

The mallard was the most common breeding duck. Breeding pairs of mallards were relatively evenly distributed on the Kootenai River between Libby Dam and Libby with an overall average of 4 per mile. Breeding pairs of ducks most commonly were observed near river islands such as the ones shown in Figure 3 and backwater sloughs (Figure 20). Three mallard nests were located during the study and information concerning these is given in Table 5. All three were located on islands. Figure 21 shows a mallard nest found on an island located at RM 217.6.

A total of 44 broods of mallards were observed during the study (Table 6). Taking into account multiple observations of the same brood (Gollop and Marshall 1954), between 25 and 30 broods of mallards were produced within the study area. An estimated 175 to 200 mallards were produced considering an average brood size of 7 (range 1-12). The most productive portion of the Kootenai River for mallard production and brood raising occurred in backwater sloughs. The backwater slough on the south side of the river between RM 210.5 and 212.5 was particularly productive (Figure 21). Figure 22 shows a mallard brood located in the backwater slough at RM 212.1 during May. The highest number of mallard broods occurred in river section 3 followed by river sections

Table 3. Number of ducks per mile recorded on 5 sections of the Kootenai River between Libby Dam and Libby during monthly surveys.

	River Section					
Date	1 (RM 218.9 - 216.6)1/	2 (RM 216.6 - 214.7)	3 (RM 214.7 - 208.9)	4 (RM 208.9 - 206.9)	5 (RM 206.9 - 201.8)	Total (17.0 mi)
Jan 27	2/					14.9
Feb 22	15.2	7.7	10.1	14.7	6.7	10.0
Mar 9	60.2	13.2	20.4	13.7	21.8	24.7
Apr 15	50.7	8.8	24.0	5.1	9.4	19.4
May 4	14.7	2.7	5.7	9.1	7.5	7.5
June 11	6.1	1.1	18.8	2.5	15.7	12.4
Jul 19	11.3	15.9	6.5	4.1	14.1	10.2
Aug 21	46.8	19.2	14.2	38.6	27.5	25.9
Sep 20	38.1	2.7	4.8	42.6	8.4	14.5
Oct 26	12.1	0.6	13.2	4.1	2.8	7.5
Nov 17	10.4	0	0	11.7	20.8	9.0
Dec 10	32.5	0	6.3	14.2	22.8	15.0
Average	27.1	6.5	11.3	14.6	14.2	14.3

1/ RM - River Mile

2/ Ducks observed during January were not identified according to river section

Table 4. Monthly census of mallards on 5 sections of the Kootenai River between Libby Dam and Libby.

Date	River Section 1 (RM 218.9 - 216.6)	2 (RM 216.6 - 214.7)	3 (RM 214.7 - 208.9)	4 (RM 208.9 - 206.9)	5 (RM 206.9 - 201.8)	Total
Jan 27						20[1/]
Feb 22		4			15	19
Mar 9	114	4	39	6	44	207
Apr 5	36		74		22	132
May 4	18	5	32	14	25	94
Jun 11			71	2	62	135
Jul 19	3		8	4	64	79
Aug 21	54	9	61	40	69	233
Sep 20	67		22	64	36	189
Oct 26	15		1	8	6	30
Nov 17	9			6	102	117
Dec 10	12		3	1	86	102

1/ Ducks were not recorded according to river section during January.

Table 5. Information concerning 3 mallard nests located in the vicinity of the Kootenai River between Libby Dam and the site of the Libby reregulation dam.

Date Located	Location	Vegetation in vicinity of nest	Distance to water	Number Eggs	Fate
5/7	RM 211.5 - log jam	thistle, horsetail, grass	15 ft	11	destroyed - avian predator
5/8	RM 217.5 - north end of island	ninebark, willow	100 ft	12	10 eggs hatched
5/10	RM 216.0 - south end of island	juniper, grass (conifer overstory)	120 ft	5	5 eggs hatched

Table 6. Information concerning waterfowl broods observed on the Kootenai River between Libby Dam and Libby.

	River Section				
	1 (RM 218.8 - 216.6)	2 (RM 216.6 - 214.7)	3 (RM 214.7 - 208.9)	4 (RM 208.9 - 206.9)	5 (RM 206.9 - 201.8)
Canada goose					
Number broods	4	4	1		
Number young	17	23	2		
Aver. brood size	4.3	5.8	2.0		
Mallard					
Number broods	4		21	8	11
Number young	24		151	68	69
Aver. brood size	6.0		7.2	8.5	6.3
Common merganser					
Number broods	5	6	9	4	3
Number young	56	50	109	52	30
Aver. brood size	11.2	8.3	12.1	13.0	10.0

FIGURE 20. Backwater located in the vicinity of river mile 211.1 on the south side of the Kootenai River.

5, 4, 1 and 2. Mallard broods were aged according to juvenile characteristics given in Gollop and Marshall (1954). Backdating of brood ages indicated that over 75% of the broods hatched between 11 May and 29 May. Hatching extended over a 52-day period beginning in late April and concluded in the middle of June.

2. Common Merganser. The common merganser occurred yearlong between Libby Dam and Libby and was the second most common duck in the study area. Mergansers were observed in all sections of the Kootenai River although there were increasing numbers of mergansers as one progressed upstream from Libby (Table 7). The highest numbers of mergansers were counted on 21 August when 155 were observed. Over 70% of the mergansers observed during the study occurred between Libby Dam and the site of the reregulation dam. Mergansers were most commonly found in the main stream of the river which is related to their feeding behavior and food habits (primarily fish - Bellrose 1976), while mallard use of backwater areas is related to their feeding primarily on aquatic vegetation and seeds. Mergansers were regularly observed loafing

FIGURE 21. Mallard nest located on a river island in the vicinity of river mile 217.6 on the Kootenai River.

FIGURE 22. Mallard brood in a backwater located in the vicinity of river mile 212.1 on the Kootenai River.

Table 7. Monthly census of common merganser on 5 sections of the Kootenai River between Libby Dam and Libby.

	River Section					
Date	1 (RM 218.9-216.6)	2 (RM 216.6-214.7)	3 (RM 214.7-208.9)	4 (RM 208.9-206.9)	5 (RM 206.9-201.8)	Total
Jan 27						42 1/
Feb 22	16		5		4	25
Mar 9	10	15	31	4	17	77
Apr 5	2		16			18
May 4	10		1			11
Jun 11	14	2	38		16	70
Jul 19	23	29	30	4	8	94
Aug 21	33	22	17	36	47	155
Sep 20	5	5	5	4	6	25
Oct 26	3	1	1		1	6
Nov 17	3				4	7
Dec 10	8		7		1	16

1/ Ducks were not recorded according to river section during January.

on large rocks and snags in and along the river. The most commonly nest in holes in trees close to water (Bellrose 1976). A total of 27 broods of mergansers were observed during the study with over 75% occurring between Libby Dam and the reregulation dam site. Accounting for multiple observations of the same broods, between 15 and 20 merganser broods were produced on the Kootenai River during 1979 and had an average brood size of 11 (range 4-32).

3. Common Goldeneye. The monthly census of common goldeneye is given in Table 8. Goldeneyes were the most commonly observed duck from December through March. During this period an average of about 100 were counted between Libby Dam and Libby. Goldeneyes were absent from the study area between 22 May and 17 November and they were not observed during 1976 and 1977 during approximately the same time period. In the Kootenai Falls area of the Kootenai River, common goldeneye were observed during the breeding season and are thought to have nested in the vicinity (Joslin 1978). Goldeneye were most commonly observed in the main stream of the river. The overall average group size of goldeneyes was 5 during this study (range 1-25). Goldeneyes feed primarily on crustaceans and fish (Bellrose 1976). Goldeneyes were relatively evenly distributed between Libby Dam and Libby which was also indicated during the 1976 and 1977 surveys.

4. Wood Duck. Wood ducks were observed on the Kootenai River from 4 May through December (Table 9). Wood ducks were observed in all river sections except the section between the Fisher River and RM 214.7. Wood duck observations occurred almost exclusively in backwater sloughs, particularly the ones occurring along the south edge of the river at RM 208 and between RM 210.5 and 212.5. A group of 75 wood ducks was observed at the backwater slough at RM 212.1 on 26 October. Although broods of wood ducks were not observed, they occurred on the study area during the breeding season and evidence of breeding pairs and territorial males (Dzubin 1969) indicated that they probably do breed on the study area.

5. Other Ducks. An additional 10 species of ducks were observed on the Kootenai River during the study primarily during spring and fall migration. In addition to the species listed in Table 9, a pair of lesser scaup were observed during a ground survey on 5 May near RM 211.3 and two Barrow's goldeneye were observed on the same day at RM 218.2. Blue-winged teal were observed during surveys in March, May and August through October and green-winged teal were seen during surveys from August through October. Although these ducks probably did not breed in the study area, they are known to breed in this region of the state (Skaar 1975). A single male harlequin duck was observed on the study area on 6 June near RM 211 in the main portion of the river. Harlequins are suspected to breed in the Kootenai Falls area (Joslin 1978). American wigeons were observed during surveys in September

Table 8. Monthly census of common goldeneye on 5 sections of the Kootenai River between Libby Dam and Libby.

	River Section					
Date	1 (RM 218.9 - 216.6)	2 (RM 216.6 - 214.7)	3 (RM 214.7 - 208.9)	4 (RM 208.9 - 206.9)	5 (RM 206.9 - 201.8)	Total
Jan 27						121 1/
Feb 22	17	5	54	29	13	118
Mar 9	10	5	49	17	38	119
Apr 5		14	30	8	16	68
May 4					6	6
Nov 17	12					12
Dec 10	55		20	12	29	116

1/ Ducks were not recorded according to river section during January.

Table 9. Monthly census of ducks other than mallards, common mergansers and common goldeneye on 5 sections of the Kootenai River between Libby Dam and Libby.

		1/27	2/22	3/9	4/5	5/4	6/11	8/21	9/20	10/26	11/17	12/10
Wood duck	1					4						
	3							1		75		7
	4					2	3		10		17	
	5					4	2			5		
Blue-winged teal	1					2		18	11			
	2							4				
	3							3				
	4					2						
	5			6				10		1		
Green-winged teal	1									8		
	4								1			
	5							14		1		
Northern shoveler	5					3						
Harlequin duck	3						1					
Pintail	1							2				
Gadwall	1							1				
American wigeon	4								4			
Hooded merganser	5			4								
Unidentified	1		2	7	79				5	2		
	2		5		2							
	3				20			1	1			
	4				2							
	5		2		10							
		71 2/										

1/ River Sections: 1(River mile 218.9-216.6); 2(RM 216.6-214.7); 3(RM214.7-208.9); 4(RM208.9-206.9); 5(RM206.9-201.8).

2/ Ducks were not recorded according to river section during January.

and during ground reconnaissance in April, August and September. Hooded mergansers were observed during surveys in March with additional observations from the ground during April, May and November. Other species observed during the study included pintails, gadwalls and northern shovelers. During surveys conducted in 1976 and 1977, the bufflehead (Bucephala albeola) and ring-necked duck (Aythya collaris) were also observed using the study area.

Lake Koocanusa was surveyed during fixed-wing flights on 5 April, 16 July and 8 October. On 5 April the reservoir was frozen over above Ten Mile Creek (approximately one-fourth of the reservoir in the U.S. was open). Ten mallards were observed at the mouth of Jackson Creek during the flight. During the flight on 16 July, 20 ducks were observed (18 mallards and 2 mergansers) at the mouths of tributaries as they emptied into the reservoir. During the 18 October flight, 17 mallards, 7 mergansers, 150 coots and 7 western grebes were observed. According to local residents large groups of waterfowl have been known to use the reservoir during migration but remain a very short time. This is probably due to the lack of available food and shoreline habitat. Use of the reservoir appears to be limited to the mouth of the creeks as they empty into the reservoir.

Canada Goose

Canada geese were first observed on 22 February and were recorded through October. According to local residents, geese have been known to occur on the study area during November. Six geese were observed on the study area at RM 212.8 on 9 February 1980 and between Libby and Kootenai Falls on 10 February 1980. Information concerning geese observed during the study (location, composition, habitat use) is given in Appendix Table 2 and summarized in Table 10. Groups of geese during the spring were usually pairs, although several larger groups (up to 7) were also observed. Canada goose observations were recorded on all five segments of the river (Table 10), although 90% of the 342 geese observed were between Libby Dam and the site of the reregulation dam. Geese are also known to occur in other areas of the Kootenai (Joslin 1978) and broods of geese have been observed in the area of Kootenai Falls (P. Graham, Montana Department of Fish, Wildlife and Parks, pers. com.). Geese were not observed on Lake Koocanusa during the study.

Geese on the study area extensively used gravel bars and islands for feeding, loafing and brood rearing (Figures 10 through 13). Canada goose use of river islands has been documented in other studies (Hinz 1977, Dimmick 1968). One successful nest was located during the study on an island at RM 212. It was located in a snag approximately 80 feet high. Remains of a nesting attempt was located on an island at RM 217.5. Evidence of broken eggs was found as well as one whole egg. Measurements of this egg (Hanson 1965) indicated the goose which laid it was of the Great Basin race (B.c. moffiti). A lone goose flew from the

Table 10. Summary of Canada goose observations on the Kootenai River between Libby Dam and Libby.

River Section	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total
1(RM 218.8-216.6)										
Survey1/			2(3)3/	3(5)	1(33)	3(37)	1(1)			10(79)
Ground2/		1(4)	5(10)	13(42)	2(11)	2(29)				23(96)
2(RM 216.6-214.7)										
Survey										
Ground					4(33)					4(33)
3(RM 214.7-208.9)										
Survey	4(21)	7(11)	4(8)	4(9)				1(1)		20(50)
Ground	2(2)	4(9)	4(6)	5(17)		1(25)			1(6)	17(65)
4(RM 208.9-206.9)										
Survey				1(1)	1(1)					2(2)
Ground										
5(RM 206.9-201.8										
Survey			2(4)		2(2)			2(4)		6(10)
Ground			1(1)	2(2)						3(3)
Fisher River										
Ground				2(4)						2(4)
TOTAL										
Survey	4(21)	7(11)	8(15)	8(15)	4(36)	3(37)	1(1)	3(5)		38(141)
Ground	2(2)	5(13)	10(17)	22(65)	6(44)	3(54)			1(6)	49(201)

1/ Surveys include helicopter, fixed-winged and jet boat surveys.

2/ Ground reconnaissance.

3/ Number of goose observations (number of geese observed).

middle of the island located at RM 216.0 and may have been nesting there. One week old goslings were observed at an island located at RM 217.8, indicating that the nest may have been nearby. On 4 May, four one week old goslings were observed near RM 211.8 and may have been the brood which hatched on the island at RM 212. During river surveys in 1977, a nest was located on a small island at RM 211.5.

On 7 June a group of 33 geese were observed on a gravel area at the mouth of the Fisher River (RM 215.1) (Figure 13). This group included 10 adults and 23 young which constituted at least 4 broods. This same group of 33 was again observed on 14 June on a gravel area at RM 217 (Figure 11) and on 24 July a group of 25 geese (young and adults) were observed on a gravel bar at RM 210.7 (Figure 12).

Using procedures given in Hanson and Browning (1959) it was estimated that six breeding pairs of geese occurred on the study area. An estimated 4 broods of geese were produced yielding between 20 and 25 young which were reared to flight. One breeding pair of geese was located between the site of the reregulation dam site and Libby, although all the broods which were observed, occurred between Libby Dam and the site of the reregulation dam. By backdating the age of observed goslings (Hanson 1967) it was determined that hatching of goose nests occurred during late April and early May.

Other Waterfowl

Ten species of waterfowl other than ducks and geese were observed on the study area. The great blue heron was the only yearlong resident of the study area. During the study 59 observations of herons were made. Herons are known to breed in this region of the state (Skaar 1975) although heron rookeries were not located on the study area. Herons feed primarily on fish and crustaceans (Jackman and Scott 1975) and were found to utilize gravel areas extensively on the study area.

Killdeer were common on the study area (over 60 observations) and were observed utilizing shoreline habitat as well as backwater sloughs and gravel areas. Killdeer young were observed on the study area as well as the spotted sandpiper young. Spotted sandpipers utilized habitats similar to killdeer, although they were not as plentiful. California gulls were observed from April through November on the study area (over 100 observations). Gulls were particularly evident around Libby Dam although they were observed throughout the study area. Other waterfowl species observed primarily during migration included common loon, western grebe, American coot, lesser yellowlegs, ring-billed gull and common snipe.

Raptors

Information relating to the 10 species of raptors observed during the study is given in Table 2. Bald eagles were observed on the study area from January through 15 March and again from 20 September through December. According to Craighead (1979) about 150 immature and 200 adult bald eagles pass through the project area on their southward migration. He also indicated that an average of six eagles used the area between Libby Dam and the reregulation dam site daily through December, January and February. Bald eagles were not observed on the study area during the nesting season although a bald eagle nest was located on the west side of Lake Koocanusa approximately 2 miles south of the Canadian border. According to Kootenai National Forest, Rexford Ranger District, the nest fledged one young in 1978 and two in 1979.

The Kootenai River is an important breeding area for osprey. Osprey were the most common raptor observed on the study area during the summer months. Ospreys arrived in the area on 8 April and were last observed on 26 September. Five osprey nests located in the vicnity of the Kootenai River between Libby Dam and Libby were attended in 1979. Information concerning these nests is given in Table 11. Three of the five nests contained eggs and the same three fledged a total of five young. The osprey nest occurring on the island at RM 212 (Figure 23) is particularly conspicuous to the public and would be directly affected by the proposed project. This nest contained 3 eggs and fledged two young in 1979. According to Kichura and Ruediger (1978) seven osprey nests occur along Lake Koocanusa and an additional six nests are located along the Kootenai River between Libby and the Idaho border.

The Kootenai River maintains an abundant fishery and this may be related to the high use which the Kootenai receives from osprey. Ospreys feed almost exclusively on fish swimming close to the surface (Brown and Amadon 1968) and studies have shown that the average length of fish taken by osprey is 12 inches (Garber 1972). The use of large fish is probably related to the osprey's high energy budget (Jackman and Scott 1975).

The American kestrel and red-tailed hawk were also commonly observed during the study. Kestrels were particularly common in the meadow area between RM 214 and RM 215 on both sides of the river. Raptors which utilized the study area during migration included rough-legged hawk, marsh hawk, golden eagle, merlin, goshawk and Cooper's hawk.

Other Birds

A total of 103 species of birds were observed during the study. The status and abundance of each bird species and the dates it was observed is given in Table 2. The percent composition of bird observations during each season is given in

Table 11. Information concerning osprey nests located in the vicinity of the Kootenai River between Libby Dam and Libby.

Location			Number Adults Attending	Number Eggs	Number Young Fledged
Township	Range	Section			
30N	29W	4	2	0	0
30N	29W	9	2	0	0
30N	30W	14	2	3	2
31N	30W	32	2	?	1
30N	30W	7	2	?	2

FIGURE 23. Osprey nest located on an island in the vicinity of river mile 212.1 on the Kootenai River.

Appendix Table 2. During summer (June through August) the highest number of species was observed (73) followed by spring (70), fall (40) and winter (33).

Although waterfowl accounted for over 60% of all birds observed, the pine siskin alone accounted for 14% of all birds. Other than mallards, pine siskins were the most common bird during all seasons except late summer and early fall. Pine siskins did occur in small groups but more often they were found in flocks of 25-100, especially during winter.

Birds which were most commonly observed during winter included pine siskin, common raven, black-capped chickadee, mountain chickadee, Bohemian waxwing and mourning dove. Common birds during the spring included pine siskin, chickadees, American robin, common crow and ruffed grouse. Common summering birds were rough-winged swallow and cliff swallow, song sparrow, chickadees, flycatchers, American robin, dark-eyed junco, American redstart, crows and mourning dove. Common birds during fall were chickadees, common crow, common raven, song sparrow and golden-crowned kinglet. Common breeding birds utilizing the river bottom habitats were American redstart, yellow warbler, song sparrow, American robin, flycatchers and pine siskin. Common breeding birds on the north and south slope coniferous forests were pine siskin, dark-eyed junco, American robin, flycatchers and chickadees.

Game birds which occur on the study area included ruffed grouse, blue grouse and turkey. Of these, the ruffed grouse was the most abundant and the only species observed on the bottomland habitats. A ruffed grouse drumming route was conducted on 7 May and included 15 stops which were located one mile apart during which the observer listened for 4 minutes and counted the number of ruffed grouse drums heard. The route started at Libby Dam and concluded 1 mile beyond Rainy Creek on the St. Regis haul road. A total of 32 drums were recorded and averaged 2.1 drums per stop. The results of this survey are very compatible with ruffed grouse drum routes conducted along Keeler Creek, Ross Creek and Stanley Creek in the West Cabinet Mountains during 1977 and 1978 (Joslin 1980). Turkey droppings, tracks and feathers were located in Canoe Gulch on 11 May. Blue grouse occur throughout the basin at higher elevations although none were observed utilizing the bottomland habitats.

Ungulates

Ungulates observed utilizing the study area included white-tailed deer, mule deer, elk and moose. The south slopes, north of the Kootenai River between Alexander Creek and Rainy Creek have been identified as important wintering areas for ungulates (Blair 1955, Knoche 1974). A portion of the area is shown in Figures 8 and 23. Information collected during 1979 and 1980 indicates significant use by wintering ungulates in this area.

Helicopter surveys were conducted during early March 1979 and early February 1980 (Table 12). The increase in the number of deer observed from 262 in 1979 to 358 in 1980, is probably due to increased coverage of and familiarization with the study area. In 1979 approximately 2 hours were spent inventorying the area while in 1980 the survey was conducted for 5 hours. During 1979 the survey was conducted with the assistance of G. Brown (MDFWP biologist). Due to the rugged terrain inventoried, the number of ungulates observed should be considered a minimum figure and a very conservative estimate of herd size.

White-tailed deer comprised over 75% of the deer observed and were consistently noted utilizing lower elevation areas during both winters (1978-79 and 1979-80) compared to mule deer. There was minimal overlap in the habitat used by mule deer and white-tailed deer and there was an overall average of 300 feet difference in the elevations at which whitetails were observed as compared to mule deer during 1979. In 1980 mule deer were observed an average of 600 ft higher in elevation than white-tailed deer. Whitetails were observed at an average of 3,010 feet (range 2,300 to 3,900) in 1979 and at 3,370 feet (range 2,450 to 4,200) in 1980. The average group size of whitetails was 3.2 and 2.9 compared to 3.9 and 4.9 for mule deer during 1979 and 1980, respectively. The reason for use of lower portions of the winter range during 1979 as compared to 1980 is primarily a result of the severity of the winter. The winter of 1979 was significantly more harsh in terms of cold temperatures and snow accumulation than that of 1980 which was relatively mild.

Ground reconnaissance indicated similar elevational use by whitetails and mule deer of the winter range (Table 13) as aerial surveys. Fawn:adult ratios and average group size information was comparable as well. During aerial surveys 46.2 and 63.4 percent of the whitetails were classified in 1979 and 1980, respectively. This information included a fawn:100 adult ratio of 70.0 in 1979 and 70.4 in 1980. Ground reconnaissance for whitetails indicated a ratio of 69.2 in 1979. These fawn:100 adult ratios are similar to ratios collected on the Fisher River/Wolf Creek winter range (Firebaugh et al. 1975) during 1970 but higher than the ratio estimated from 1971 to 1974. The relatively high fawn:adult ratio estimated in 1979 and 1980 may also be a result of only about 50% of the deer being classified. Large groups of whitetails were often not possible to classify and it was possible that many of these larger groups were primarily adults which would tend to lower the fawn:100 adult ratio.

During the study, nine highway and railroad-killed deer were found on the study area. Information concerning these deer is given in Table 16. Three were highway mortalities and the remaining were railroad kills. Studies conducted on deer-vehicle collisions have shown that this type of mortaility may be significant. Studies conducted during 1971 through 1975 indicated that 95 deer were killed along 15 miles of relocated railroad near the

Table 12. Summary of ungulate observations on winter range north of the Kootenai River between Alexander Creek and Rainy Creek during helicopter surveys on 9 March 1979 and 18, 20 and 21 February 1980.

	Male	Female	Unclass. Adults	Young	Unclass.	Total	Percent Class.	Aver. Group Size	Aver. Elev. (ft)	Fawns: 100 Adults
Rainy Cr. to Kennedy Gulch										
1979 white-tailed deer		2		2	6	10	40.0	2.0	2,900	100.0
mule deer		1		2		3	100.0	3.0	3,300	
elk		2		2		4	100.0	4.0	3,100	
1980 white-tailed deer		14	8	18	12	52	76.9	2.6	3,300	81.8
mule deer						0				
elk			3	2		5	100.0	5.0	3,500	
Kennedy Gulch to Reinshagen Gulch										
1979 white-tailed deer		12	9	19	38	78	51.3	3.1	2,950	90.5
mule deer			3	3	11	17	35.3	3.4	3,340	
elk		1				1	100.0	1.0	3,500	
1980 white-tailed deer		23	17	32	42	114	63.2	3.2	3,325	80.0
mule deer		1	4	2	24	31	22.6	4.3	4,640	
elk				1	5	6	16.7	3.0	4,050	
Reinshagen Gulch to Canoe Gulch										
1979 white-tailed deer					19	19	0	6.3	2,950	
mule deer			1	4	12	17	29.4	5.7	3,600	
elk	4					4	100.0	4.0	4,200	
1980 white-tailed deer		6	9	9	20	44	54.5	2.2	3,380	60.0
mule deer					2	2	0	1.0	4,900	
elk						0				
Canoe Gulch to Alexander Cr.										
1979 white-tailed deer		2	25	14	36	77	53.3	3.1	3,100	51.9
mule deer	4		9	8	20	41	51.2	3.7	3,850	
elk						0				
1980 white-tailed deer		19	19	22	39	99	60.6	3.1	3,450	57.9
mule deer	1				15	16	6.3	16.0	4,100	
elk		1		1		2	100.0	2.0	4,200	
TOTAL										
1979 white-tailed deer		16	34	35	99	184	46.2	3.2	3,010	70.0
mule deer	4	1	13	17	43	78	44.9	3.9	3,650	
elk	4	3		2		9	100.0	3.0	3,600	
1980 white-tailed deer		62	53	81	113	309	63.4	2.9	3,370	70.4
mule deer	1	1	4	2	41	49	16.3	4.9	4,640	
elk		1	3	4	5	13	61.5	3.3	3,950	

Table 13. Summary of deer observations on winter range north of the Kootenai River between Alexander Creek and Rainy Creek during ground reconnaissance during late winter and early spring 1979.

	White-tailed deer	Mule deer
Female	12	10
Unclassified adults	1	16
Fawns	9	15
Unclassified	22	20
Total	44	61
Percent classified	50.0	67.2
Average group size	2.2	3.6
Average elevation (feet)	2,660	2,925
Fawns:100 adults	69.2	57.7

Fisher River (Firebaugh et al. 1975). The number of deer killed along the highway and railroad as well as the number observed crossing these conveyances indicates that movements between north and south slopes and the bottomland does occur during all seasons.

Deer use of the bottomland was recorded during all seasons. A summary of deer observations and sign during ground reconnaissance is given in Table 14. Over 90% of the deer observed were white-tailed deer. Mule deer were observed along the St. Regis haul road and at the transect along the Fisher River. Deer pellet group surveys were conducted at the five established transects. Results of these are given in Table 15. The highest density of pellet groups per acre occurred at the Deciduous Bottomland Transect. High densities of pellet groups were also recorded at the South Slope Coniferous Transect which is a part of the deer winter range on the Kennedy Terrace. Pellet group transects were conducted in Canoe Gulch from 1973 through 1975 (Knoche and Brown 1975). This area was also included in the winter range surveyed during aerial surveys in 1979 and 1980. Information from the Canoe Gulch studies indicated that on their control site, pellet group densities varied from 24 to 105 groups per 1/10 acre at the 2400 transect. Comparison of these data with data in Table 15 indicates that relatively similar densities of deer utilized the bottomland habitats during winter as were present on the south slope winter range.

Elk use of the winter range area appears to be increasing during recent years according to local residents. This increase may be due in part to recent road closures by the U.S. Forest Service in the area. A total of 22 elk were observed on the winter range during both years with 16 of these occurring between Rainy Creek and Reinshagen Gulch. Average elevations at which elk were observed during aerial surveys was approximately 300 feet higher in 1980 (3,950 feet) than during 1979 (3,600 feet). On the established transects elk sign was noted only on the Mixed Deciduous and Coniferous Bottomland Transect along the Fisher River.

Moose sign was noted on the Coniferous North Slope Transect (across from Rainy Creek) during winter. Moose sign was also noted on several occasions in the area near a backwater slough at RM 208, on the west side of the river. Fresh tracks and droppings were noted of a cow and calf on 24 June and a shed moose antler was found in the same area on 23 July.

Large Carnivores

Large carnivores which occurred on the study area included black bear, mountain lion, coyote and bobcat. These species range over a relatively large area and generally are not very observable. Although few observations of these species were recorded, they nonetheless utilized the study area to fulfill a portion of their yearlong habitat requirements.

Table 14. Summary of observations of ungulates during general ground reconnaissance and on 5 transects on the Libby reregulation dam study area.

Area	Species	Male	Female	Unclass. Adult	Young	Unclas-sified	Fresh Sign 1/
Coniferous North slope Transect	white-tailed deer	1					
	unknown deer						36
	moose						3
Coniferous South slope Transect	white-tailed deer	3	1	1	2		
	unknown deer						44
Coniferous Bottomland Transect	white-tailed deer		2	1	2		
	unknown deer						32
Deciduous Bottomland Transect	white-tailed deer	3	1		2		11
	unknown deer						
Mixed Coniferous Deciduous Bottom-land Transect	white-tailed deer	3	2		2		
	mule deer				2		
	unknown deer						22
	elk						2
General Reconnaissance	white-tailed deer		9	7			
	mule deer	1	1	2			
	unknown deer			1			15
	moose						3

1/ Sign includes fresh tracks, pellet groups, beds.

Table 15. Comparison of deer pellet group surveys conducted on 5 transects on the Libby reregulation dam study area.

	Coniferous North Slope	Coniferous South Slope	Coniferous Bottomland	Deciduous Bottomland	Mixed Coniferous-Deciduous Bottomland
Date	9 May	8 May	9 May	8 May	10 May
Distance (feet)	2,200	2,250	3,000	1,500	2,150
Number Pellet Groups	64	90	67	85	59
Number Acres Inventoried	0.303	0.310	0.413	0.207	0.296
Pellet Groups/ Acre	211.2	290.3	162.2	410.6	199.3

Table 16. Information concerning deer killed on the highway and railroad on the Libby reregulation study area.

Date[1/]	Species	Location	Classification	Type
1/23	white-tailed deer	RM 208.7 (north side)	Unclassified adult	Highway 37
1/24	unknown deer	RM 210 (south side)	Unclassified adult	BN Railroad
1/25	white-tailed deer	RM 211.5 (south side)	Unclassified adult	BN Railroad
1/25	white-tailed deer	RM 210.9 (south side)	Unclassified adult	BN Railroad
1/25	white-tailed deer	RM 210.3 (south side)	Unclassified adult	BN Railroad
3/8	white-tailed deer	RM 211.6 (north side)	Adult female	Highway 37
4/6	white-tailed deer	RM 208.1 (south side)	Adult female	BN Railroad
6/18	Mule deer	RM 205.8 (north side)	Adult male	Highway 37
10/18	white-tailed deer	RM 216.3 (west side)	Adult female	Forest development road

1/ Date kill was found; does not necessarily represent date deer was killed.

Black bear observations during the study included two observations and two instances of sign. A medium sized black bear (black phase) was observed foraging on the south slope directly north of RM 211 (S 10 T30N R30W) on 9 May. A small black bear (brown phase) was observed on 22 May running from the Deciduous Bottomland Transect (RM 215.2) across the St. Regis haul road and up the north facing sidehill. Black bear scats were found in September on the St. Regis haul road at RM 209.1 and in the Coniferous North Slope Transect across from Rainy Creek.

The degree of use of the study area by mountain lion is not entirely known although an adult female lion was shot during the hunting season near Tony Peak (south of RM 214). This lion had been nursing two kittens.

During January a coyote skull was found in the Coniferous South Slope Transect (Kennedy Terrace). Two coyotes were observed on 25 January on the ice on Lake Koocanusa within a mile of the dam feeding on a deer carcass. One additional coyote was observed during September in a meadow approximately 1/4 mile upstream from the site of the reregulation dam on the south side of the river. The coyote ran across the meadow and crossed the St. Regis haul road.

Bobcats are known to occur throughout the Kootenai River Basin and during the study a bobcat was observed on 7 May. The bobcat was observed crossing the St. Regis haul road from the north in the vicinity of RM 211.5 (Sec 15 T30N R30W).

Other Mammals

A list of the mammals observed during the study is given in Table 17. The red squirrel was one of the most commonly sighted (and heard) mammals on the study area. It occurred throughout the area and was recorded during all seasons. Yellow pine chipmunks were also relatively common and were the second most abundant small mammal caught during snap-trap trapping activities during September (Table 18). Chipmunks were captured in all traplines except the grassland line. The most abundant small mammal on the study area was the deer mouse in all trapping locations. Other small mammals caught included: masked shrew, vagrant shrew, meadow vole, mountain vole and red-backed vole. Small mammal trapping was conducted at six locations, five of which coincided with established walking transects. The grassland trapline was added to gain information regarding wildlife use of meadow type habitat. This trapline had the lowest diversity and abundance of small mammals of any of the traplines. Three species were caught, with deer mice accounting for 21 of the 36 small mammals caught. This transect had the highest occurrence of meadow voles of any trapline. The highest abundance of small mammals occurred at the Deciduous Bottomland trapline which had an overall trap success of 48.3 (number of small mammals per 100

Table 17. Mammalian species observed on the Libby reregulation dam study area.

Species	Scientific Name
Masked shrew	*Sorex cinereus*
Vagrant shrew	*Sorex vagrans*
Snowshoe hare	*Lepus americanus*
Columbian ground squirrel	*Spermophilus columbianus*
Yellow pine chipmunk	*Eutamias amoenus*
Red squirrel	*Tarmiasciurus hudsonicus*
Beaver	*Castor canadensis*
Muskrat	*Ondatra zibethica*
Deer mouse	*Peromyscus maniculatus*
Bushy-tailed woodrat	*Neotoma cinerea*
Red-backed vole	*Clethrionomys gapperi*
Meadow vole	*Microtus pennsylvanicus*
Mountain vole	*Microtus montanus*
Coyote	*Canis latrans*
Black bear	*Ursus americanus*
Long-tailed weasel	*Mustela frenata*
Mink	*Mustela vison*
Striped skunk	*Mephitis mephitis*
Mountain lion	*Felis concolor*
Bobcat	*Lynx rufus*
Elk	*Cervus canadensis*
Mule deer	*Odocoileus hemionus*
White-tailed deer	*Odocoileus viginianus*
Moose	*Alces alces*

Table 18. Results of small mammal snap-trapping along 6 transects on the Libby reregulation dam study area.

Transect[1/]	Date	Peromyscus maniculatus	Sorex cinereus	Sorex vagrans	Eutamias amoenus	Microtus pennsylvanicus	Microtus montanus	Clethrionomys gapperi	Total	Trap success[2/]
Coniferous North slope	9/22	18	1					1	20	33.3
	9/23	12	1		4				17	28.4
	9/24	14	2		1			1	18	30.1
	Total	44	4		5			2	55	30.6
Coniferous South slope	9/12	21	1						22	36.7
	9/13	11			1				12	20.0
	9/14	8							8	13.4
	Total	40	1		1				42	23.3
Coniferous Bottomland	9/12	14	1	2	3			4	24	40.1
	9/13	12	6		1			1	20	33.4
	9/14	4		1				1	6	10.0
	Total	30	7	3	4			6	50	27.8
Deciduous Bottomland	9/12	21	2		5				28	46.8
	9/13	20		2	7	2			31	51.7
	9/14	25		3					28	46.8
	Total	66	2	5	12	2			87	48.3
Mixed Deciduous-Coniferous Bottomland	9/22	22		2	1	3	1	2	31	51.7
	9/23	17	2	1		2	1	2	25	41.7
	9/24	15	1	1	2	3	2		24	40.1
	Total	54	3	4	3	8	4	4	80	44.4
Grassland	9/22	9				5			14	23.4
	9/23	10	1			4			15	25.1
	9/24	2	2			3			7	11.7
	Total	21	3			12			36	20.0
TOTAL		255	20	12	25	22	4	12	350	32.4

1/ Each transect was sampled with 60 snap-traps for three nights equalling 180 trap nights per trapline.

2/ Trap success - number of small mammals caught per 100 trap nights.

trap nights). The Mixed Coniferous and Deciduous Bottomland trapline also had a high trap success and also had the highest diversity of mammals caught (7 species).

Snowshoe hare were observed during all seasons on the study area. They occurred throughout the study area although they were most common in bottomland habitats. A road-killed skunk was observed on the study area on 21 July on Highway 37, 1/4 mile west of the site of the haul bridge. A road-killed bushy-tailed wood rat was found along the St. Regis haul road in the vicinity of RM 208 (Sec 5 T30N R30W). The presence of wood rats in this area may be related to rock outcroppings present on the south side of the road. Mustelidae sign was located in several areas along the river. A long-tailed weasel was observed along the west bank of the Kootenai River along the old railroad grade near RM 215.3 during April. A marten was also observed on the north side of a river island at RM 212.1 (Sec 14 T30N R30W) during August.

River otters (Lutra canadensis) may occur in the study area although none were observed during the study. River otters are known to occur in the Kootenai Falls area of the river (Montana Department of Natural Resources and Conservation 1979). Two beaver caches were located during late fall on the study area. These caches were located in backwater sloughs located at RM 212.2 and 211 (Figure 6). An additional beaver cache and dam occurred in the established transect along the Fisher River in the portion of the old Fisher River channel. Beaver sign (fresh cuttings, slides) were noted at the mouth of Dunn Creek, the island at RM 217.5 and the south bank of the Kootenai in the vicinity of RM 213. Backwater sloughs and river banks (Figure 24) are vital habitat for beaver and were used to a large extent by muskrat and mink. Muskrats were observed in several backwater sloughs and mink, and mink sign, were also recorded in these areas and along river banks.

FIGURE 24. River bank in the vicinity of river mile 217 on the west side of the Kootenai River.

Wildlife Use of Intensive Study Area

Intensive study was conducted on five areas: three included borrow sites outside the proposed reservoir boundary; one was located in a borrow area which would be inundated by the proposed reservoir and one was in a representative habitat along the Kootenai River which also would be inundated. Locations of these transects are shown in Figure 5. A discussion of the vegetation occurring at each of the areas is given in the Study Area portion of this report. The percent frequency of occurrence of bird species and the percent composition of birds for each transect by season is presented for winter (Appendix Table 3), spring (Appendix Table 4), summer (Appendix Table 5) and fall (Appendix Table 6). A summary of this information is given in Table 19. The results of small mammal trapping conducted on each of the areas is presented in Table 18. A summary of ungulate observations for each area is given in Table 14 and the results of pellet group surveys for each transect are given in Table 15.

1. Coniferous North Slope Transect. This transect was located within the Zonolite Terrace Borrow Site, which is south of the Kootenai River in the vicinity of Rainy Creek (Figure 14). Bird transects conducted during four seasons indicated that this transect had the lowest percent frequency of occurrence of any of the transects yearlong. Percent frequency of occurrence is an index of density. This transect had the second lowest bird species diversity with 29 species recorded during the year. Over 90% of all mourning doves observed during the study were recorded at this transect. The high incidence of mourning doves at this site is probably related to the disturbed nature of a portion of the site which was used as a refuse dump.

Characteristic birds observed using this transect were: winter - pine siskin, mourning dove, black-capped chickadee, mountain chickadee and common raven; spring - pine siskin, mourning dove, dark-eyed junco, American robin and common crow; summer - mourning dove, dark-eyed junco, chipping sparrow, pine siskin and common crow; breeding - mourning dove, dark-eyed junco, pine siskin, American robin, common crow and chipping sparrow; fall - ruffed grouse, mourning dove, pileated woodpecker, common raven and brown creeper.

Four small mammal species were caught during snap-trapping activities in September. Deer mice accounted for 44 of the 55 mammals caught. The trap success was mid-way among the other transects. Trap success is defined as the number of small mammals caught per 100 trapnights. This figure was calculated from the 180 trap nights at each trapline. Other small mammals caught included masked shrew (4), yellow pine chipmunk (5), and red-backed voles (2).

The deer pellet group survey for this transect indicated the estimated number of pellet groups per acre was mid-way among the other transects. Thirty-six instances of fresh deer sign were noted at the transect during the study and one white-tailed deer was observed during November. This transect was the only one in

Table 19. Summary of bird surveys conducted on 5 transects on the Libby reregulation dam study area.

	Transect				
	Coniferous North Slope	Coniferous South Slope	Coniferous Bottomland	Deciduous Bottomland	Mixed Coniferous-Deciduous Bottomland
Transect length(ft)	2,370	2,250	3,000	1,500	2,200
Number stations	95	90	120	60	82
Percent Frequency of Occurrence:					
winter (2)1/	23.8	20.5	26.5	29.8	13.5
spring (5)	24.7	29.4	38.4	51.7	29.1
summer (3)	37.5	40.5	66.6	77.7	45.0
fall (1)	10.5	11.0	26.8	39.9	31.9
Number Species					
winter (2)	12	13	18	14	14
spring (5)	21	13	33	31	26
summer (3)	17	17	29	33	25
fall (1)	15	4	10	7	12
total species	29	25	50	51	40
Number birds					
winter (2)	239	286	194	232	98
spring (5)	176	193	463	145	222
summer (3)	143	74	194	114	84
fall (1)	7	9	30	21	46

1/ Number of surveys conducted during each season.

which moose sign was recorded. Several moose pellet groups were recorded during late fall and winter. Black bear scats were noted on this transect during September. Other mammals observed at this site included red squirrel and showshoe hare. Columbian ground squirrels were observed along the St. Regis haul road which borders this site.

2. Coniferous South Slope Transect. This transect was located on the Kennedy Terrace Borrow Site, which is north of the Kootenai River in the vicinity of the haul bridge site (Figures 15 and 16). Twenty-five species of birds were observed along this transect although the transect had the second lowest percent frequency of occurrence yearlong.

Pine siskins were the most common bird during winter and spring, accounting for over 70% of all birds observed during this time. Characteristic birds observed during various seasons were: winter - pine siskin, black-capped chickadee, mountain chickadee and common raven; spring - pine siskin, black-capped chickadee, mountain chickadee, ruffed grouse and dark-eyed junco; summer - dark-eyed junco, flycatchers, pine siskin and brown-headed cowbird; breeding - pine siskin, dark-eyed junco, flycatchers, American robin and ruffed grouse; fall - black-capped chickadee, golden-crowned kinglet, common raven and ruffed grouse.

Except for the grassland trapline, the lowest small mammal trap success was recorded at this transect. The lowest small mammal species diversity was recorded at this and the grassland trapline (3 species). Deer mice constituted 40 of the 42 small mammals caught. A masked shrew and yellow pine chipmunk were also caught.

The second highest estimated pellet groups per acre were recorded along this transect. Seven white-tailed deer were observed and fresh deer sign was recorded during all seasons. The highest instance of fresh deer sign was recorded at this transect (Table 14) and may have been related to the open nature of the understory which enhanced observation ability. Characteristic medium-sized mammals included red squirrel, Columbian ground squirrel and snowshoe hare. A dead skunk was found along Highway 37 in the area which forms the southern border of this site. A coyote skull was found on the site during the study.

3. Coniferous Bottomland Transect. This transect was located on a river island near RM 211 (Figure 17). Fifty species of birds were observed during the year and this transect had the second highest percent frequency of occurrence yearlong. Characteristic birds were: winter - black-capped chickadee, pine siskin, common raven, common goldeneye and mallard; spring - American robin, flycatchers, chickadee, pine siskin and mallard; summer - American robin, flycatchers, chickadee, pine siskin and mallard; summer - American robin, song sparrow, yellow warbler, American redstart, flycatchers,and mallard; breeding - pine siskin, flycatchers,

yellow warbler, American robin and American redstart; fall - chickadees, song sparrow, common raven, mallard and common merganser. The backwater slough south of the island was used extensively by mallard broods, killdeer and spotted sandpiper. Common merganser and common goldeneye were also common north of the island in the main stream of the river.

Fifty small mammals were captured at this transect, with 30 of the 50 being deer mice. Others captured included masked shrew (7), vagrant shrew (2), yellow pine chipmunk (4) and red-backed vole (6). Trap success at this trapline was mid-way among the other traplines. The highest number of red-backed voles and masked shrews were caught at this trapline.

The lowest estimated number of pellet groups per acre was calculated for this transect. Thirty-two instances of deer sign were noted and 5 white-tailed deer were observed during the year. Common medium-sized mammals were red squirrel and snowshoe hare. Beaver and muskrat utilized the backwater south of the transect (Figure 20) and a beaver cache was located in the backwater during fall. A marten was observed on the river island east of the transect.

4. Deciduous Bottomland Transect. This transect was located south of RM 215.1 near the mouth of the Fisher River (Figure 9). During the year of study, this transect had the highest bird species diversity (51 species) and the highest percent frequency of occurrence during all seasons. Characteristic birds were: winter - Bohemian waxwing, pine siskin, song sparrow, common raven, mallard and common merganser; spring - pine siskin, American robin, yellow warbler, American redstart, brown-headed grosbeak and song sparrow; summer - American redstart, American robin, red-eyed vireo, Swainson's thrush, song sparrow; breeding - American redstart, red-eyed vireo, yellow warbler, American robin, Swainson's thrush, flycatchers, and song sparrow; fall - song sparrow, black-capped chickadee and pileated woodpecker.

This transect was as important for small mammals as it was for birds. The small mammal trapping sucess of 48.3 was the highest of any trapline. Of the 180 trapping attempts, over 90% of the traps had been disturbed in some manner: small mammals were captured; the traps had been dragged away; the bait had been removed or the traps had been sprung. This trapline caught the highest number of deer mice (66), vagrant shrews (5) and yellow pine chipmunks (12). Other small mammals caught were masked shrews (2) and meadow voles (2).

The pellet group surveys indicated that the highest estimated number of pellet groups per acre (410.6) occurred at this transect. Fresh deer sign was noted during all seasons and 6 white-tailed deer were observed. Medium-sized mammals observed on this transect during the year were red squirrel and snowshoe hare. A young black bear was observed on 5 May running from the transect across the St. Regis haul road and up the sidehill on the south side of the river.

5. Mixed Coniferous-Deciduous Bottomland Transect. This transect was located approximately 2 miles up the Fisher River from its mouth (Figure 18) and is included on the Fisher River Borrow site. Forty species of birds were observed at this transect and the percent frequency occurrence during all seasons was mid-way between the two bottomland transects and the north and south slope coniferous forests. Characteristic birds were: winter - pine siskin, chickadees, golden-crowned kinglet, common raven and mallard; spring - pine siskin, chickadees, American robin, song sparrow, flycatchers and ruffed grouse; summer - song sparrow, Swainson's thrush, American redstart, golden-crowned kinglet, flycatchers, yellow warbler and ruffed grouse; breeding - song sparrow, flycatchers, Swainson's thrush, American redstart, and chickadees; fall - common raven, black-capped chickadee, golden-crowned kinglet and mallard. Three geese were observed circling the transect on 8 May although none actually landed. A single goose was observed on 10 May on a snag on the west side of the transect along the old Fisher River channel, although geese are not thought to have nested on the site.

This transect combined characteristics of both coniferous and deciduous forests and had the highest diversity of small mammal species (7). The second highest small mammal trapping success (44.4) was also recorded at this trapline. Fifty-four of the 80 small mammals were deer mice. This was the only transect in which mountain voles were captured (4). Other small mammals captured included masked shrew (3), vagrant shrew (4), yellow pine chipmunk (3), meadow vole (8) and red-backed vole (4).

The pellet group survey indicated that the second lowest estimated number of pellet groups per acre was recorded at this transect. Fresh deer sign was noted during all seasons and although mule deer may have occurred in other transects, they were only observed on this site on 24 January. Seven white-tailed deer were also observed during the year. This transect was the only one in which elk sign was recorded. Several elk pellet groups were observed during winter on this transect.

Beaver utilized the old Fisher River channel on the west side of the transect and a beaver dam and cache were also present. Characteristic medium-sized mammals included snowshoe hare and red squirrel. Columbian ground squirrels were not observed on this transect although they were observed in an open field south of the site.

ASSESSMENT OF IMPACTS

Extensive Study Area

Construction of the proposed Libby reregulating dam and reservoir, together with associated developments including the relocation of the railroad and highways, will result in permanent removal of 1,400 acres of wildlife habitat along the Kootenai River.

Wildlife which utilize this acreage to fulfill yearlong habitat requirements, such as most small and many intermediate sized mammals, would be directly impacted; i.e., individual animals would be killed if the project is implemented. Wildlife which derive a portion of their yearlong habitat requirements from the affected area, such as moose, deer, bear and all bird species, would be indirectly impacted; i.e., they may or may not be killed outright if the proposed project is implemented, but reduced habitat availability as well as stress would reduce populations of these wildlife as well. A loss of even a portion of a species' habitat results in a lower carrying capacity of the ecosystem which eventually results in a reduction of wildlife numbers which the area is capable of supporting.

In the proposed reservoir area the loss of food, loafing sites, nesting and brood rearing areas would severely reduce the use of this section of river by waterfowl. Waterfowl use of the Kootenai River was found to be significant; ducks utilized the river yearlong. The bottomland habitats are important breeding areas for several species of ducks, Canada geese and shorebirds. Over 60% of the monthly average of 250 ducks inventoried from Libby Dam to Libby occurred between Libby Dam and the site of the reregulating dam. Mallards were the most common breeding duck and over 60% of the following observations occurred between Libby Dam and the proposed reregulation dam site: 40 breeding pairs, 25 to 30 broods and 175 to 200 young. Common mergansers were the second most common breeding duck in the area. Seventy percent of the common merganser observations and over 75% of the merganser broods occurred in the area to be inundated by the proposed reservoir. Common goldeneyes were the most common duck during the winter months and over 60% of these observations occurred between Libby Dam and the site of the proposed reregulating dam. Ninety percent of the 342 observations of Canada geese occurred in the proposed reservoir area as well as all 4 broods which were observed (between 20 and 25 young). Loss of habitat in the proposed reregulating reservoir would significantly reduce numbers of great blue herons, killdeer, spotted sandpipers and other shorebirds which are now found in this area.

Osprey use of the proposed reregulating dam reservoir area would be reduced if the project is realized. Ospreys depend almost solely on fish which are usually 12 inches or over in size and especially upon those feeding close to the water's surface. The fishery in the proposed reservoir is expected to decline but in particular, members of the family Salmonidae will be reduced. Commensurate with this reduction in the food supply, will be a similar reduction in osprey numbers. The reduction of aquatic and terrestrial prey species due to river alteration would reduce the populations of other raptors using the area.

Over 100 species of birds were observed on and adjacent to the Kootenai River. Bottomland habitat had higher bird species diversity and density compared to surrounding habitats. The removal of habitat, through the rock borrowing process or inundation

from the proposed reservoir, will result in reduction of carrying capacity of the Kootenai River Basin for endemic bird species. Although birds are mobile, their ability to survive in adjacent habitats is not likely because adjacent habitats are occupied at the level of bird use of which they are capable of maintaining. Once habitat is destroyed, movement into and survival of wildlife into "unoccupied" habitat is a theory not supported by biological studies.

The loss of bottomland habitat in the proposed reregulating reservoir area would severely reduce ungulate use of this area and lower the overall carrying capacity of the basin. During two helicopter surveys of the south slopes between Alexander Creek and Rainy Creek, 262 and 358 deer were inventoried during 1979 and 1980, respectively. These figures must be considered minimums due to the difficulty of inventorying deer in this type terrain. Over 20 elk were also observed during these surveys. Seventy-five percent of the deer observed during these aerial surveys were white-tailed deer, while over 90% of the deer observed on the bottomlands during ground reconnaissance were whitetails. Deer utilized the bottomland habitats yearlong. Deer pellet group information indicated that similar densities of deer utilized the bottomland habitats during winter as used the winter range north of the Kootenai River. Information concerning highway and railroad killed deer indicated that deer move down from the north and south slopes to utilize bottomland habitats; the information suggested that deer use of the bottomland habitats may be more intensive during winter than other times of the year.

Large carnivores which occur in the area that would be affected by the proposed reregulating dam project include black bear, coyote and bobcat. The loss of habitat due to the proposed project would result in a loss in prey species for these wildlife. Bottomland habitats were found to maintain higher species diversity and density than surrounding habitats. The loss of bottomland habitat would result in a lowering of carrying capacity for large carnivores in the basin.

Small mammals whose home range is included in the area to be affected by the proposed project would suffer direct impacts. These mammals include several species of mice, voles, shrews, yellow pine chipmunks, red squirrels, snowshoe hares, beaver, mink and muskrat.

Intensive Study Area

Intensive study was conducted at five areas along the Kootenai River which included: three borrow sites occurring outside the boundary of the proposed reservoir; one borrow site to be inundated by the proposed reservoir; and one additional bottomland area representative of habitat to be inundated by the proposed reservoir. Wildlife information collected at each of these areas is presented and discussed in the Results portion of this report. A diversity of wildlife was found at all areas of intensive study although the highest diversity and density species occurred in the bottomland

habitats. All study areas received deer use during all seasons of the year. Moose sign was noted at the Zonolite Terrace Borrow Site only. Elk sign was noted at the Fisher River Borrow Site only. Several species of large carnivores occurred in habitats adjacent to the Kootenai River. Black bear sign was recorded at the Zonolite Terrace Borrow Site and coyote sign was noted at the Kennedy Terrace Borrow Site. Small mammal trapping indicated that the highest species diversity and occurrence occurred in the bottomland areas. Medium sized mammals such as the red squirrel and snowshoe hare were present in all study areas. Birds were also present yearlong in all study areas although the highest species diversity and density were on the bottomland transects.

Wildlife habitat at the two study areas within the proposed reservoir area would be permanently removed. The mining of borrow material in the areas not planned to be inundated by the proposed reservoir would remove vegetation and destroy existing wildlife habitat. Habitat rendered unavailable due to human activities would result in reduction and/or loss of individual wildlife species from these areas. Proper reclamation of the borrow areas may, in time, return the habitat to the condition in which it existed prior to being mined for borrow.

RECOMMENDATIONS

The adverse impacts as a result of the activities associated with the proposed Libby reregulating dam project would result in habitat disturbance, direct wildlife losses and a lowered carrying capacity for wildlife in the Kootenai River Basin. The following recommendations are provided as an attempt to mitigate some of the wildlife losses:

1. Every effort should be made to remove as much borrow material as possible from within the proposed reservoir area. Borrow material removed from outside of the proposed reservoir area should first be removed from the existing borrow area west of the St. Regis haul road at the Fisher River Borrow Site; secondly from the Zonolite Terrace Borrow Site; thirdly from the Kennedy Terrace Borrow Site; and lastly from the portion of the Fisher River Borrow Site east of the St. Regis haul road. Mining of the borrow material should disturb as little land as is possible to procure the needed material. Top soil from the site should be stockpiled and redistributed once the mining is accomplished.

2. A reclamation agreement for the borrow sites outside the proposed reservoir area should be drawn up in coordination with the Montana Department of Fish, Wildlife and Parks. The reclamation plan should include grading the borrow site to its predisturbance grade. Top soil should then be replaced and the area thoroughly seeded with a legume-grass mixture to prevent erosion. The area should be allowed to let succession take its natural course, but monitoring of the seeded areas should continue to ensure that erosion does not set in, in which case proper measures should be implemented to control it.

3. Because waterfowl habitat would be lost as a result of the project, federal funds should be appropriated to purchase 1,200 acres of waterfowl breeding habitat in western Montana. Emphasis should be placed upon purchasing an area for the development of Canada goose nesting and brood rearing habitat.

4. As a result of lost ungulate habitat from the proposed project, federal funds should be appropriated to purchase 1,400 acres of ungulate winter range in western Montana.

5. The relocated railroad and highways should be built as close to the high water line of the proposed reservoir as possible in order to minimize deer-vehicle collisions.

6. The portion of the Kootenai River in the vicinity of RM 218 (Figure 25) should be developed into a waterfowl marsh. A waterfowl management program should be developed in cooperation with the MDFWP. The marshes would likely be used by several species of shorebirds as well as ducks. A few ducks may use the area for nesting and brood rearing.

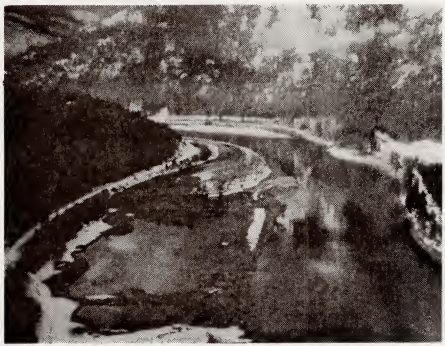

FIGURE 25. Gravel area in the vicinity of river mile 218 which may be developed into duck ponds.

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A P P E N D I X

Appendix Table 1. Percent composition according to seasons of bird species observed on the Libby reregulation dam study area.

	Winter (2129)1/	Spring (2677)1/	Summer (2357)1/	Fall (912)1/	Total (8075)
Common loon				0.1	TR
Western grebe				0.4	TR
Great blue heron	0.1	0.4	1.4	1.4	0.7
Canada goose	1.1	5.1	7.3	1.2	4.2
Mallard	11.0	27.5	29.0	43.0	25.3
Gadwall			0.1		TR
Pintail			0.1		TR
Green-winged teal			0.6	1.1	0.3
Blue-winged teal		0.4	1.5	1.2	0.7
American wigeon		0.9	0.1	1.0	0.5
Northern shoveler		0.1			TR
Wood duck	1.0	0.7	0.4	12.2	2.0
Lesser scaup		0.1			TR
Common goldeneye	28.1	14.5		1.5	12.4
Barrow's golden-eye		0.1			TR
Harlequin duck			0.1		TR
Hooded merganser		0.2		0.1	0.1
Common merganser	6.2	8.2	21.4	5.9	11.3
Goshawk				0.1	TR
Cooper's hawk			0.1		TR
Red-tailed hawk		0.2	0.3	0.3	0.2
Rough-legged hawk		0.1	0.1		0.1
Golden eagle	0.1			0.3	TR
Bald eagle	1.5	0.5		4.5	1.1
Marsh hawk				0.2	TR
Osprey		0.5	0.9	0.7	0.5
Merlin			0.1		TR
American kestrel		0.1	0.8	0.1	0.3
Blue grouse		0.2			TR
Ruffed grouse	0.2	1.2	0.5	0.4	0.7
Turkey		0.1			TR
American coot			0.1		TR
Killdeer		1.0	1.3	0.4	0.8
Common snipe		0.1			TR
Spotted sandpiper		0.2	0.9		0.3
Lesser yellowlegs			0.9		0.3

Appendix Table 1. (continued)

	Winter (2129)1/	Spring (2677)1/	Summer (2357)1/	Fall (912)1/	Total (8075)
California gull		0.1	2.4	5.0	1.3
Ring-billed gull				0.2	TR
Rock dove	1.4	0.9	0.3		0.8
Mourning dove	5.0	0.9	3.1	0.2	2.6
Great horned owl	0.1	0.1	0.2		0.1
Common nighthawk			0.1		TR
Vaux's swift			0.1		TR
Rufous hummingbird		0.1	0.3		0.1
Belted kingfisher		0.2	0.3	0.6	0.2
Common flicker	0.1	0.4	0.4		0.3
Pileated woodpecker	0.1		0.1	0.4	0.1
Lewis' woodpecker			0.1		TR
Yellow-bellied sapsucker		0.2	0.3	0.1	0.2
Hairy woodpecker	0.1	0.1	0.1		0.1
Downy woodpecker		0.1	0.2		0.1
Eastern kingbird		0.1	0.3		0.1
Flycatcher		0.9	1.4		0.7
Violet-green swallow		0.4	0.3		0.2
Rough-winged swallow		0.1	1.8		0.6
Barn swallow			0.7	0.6	0.3
Cliff swallow			1.9		0.6
Gray jay			0.1	0.1	TR
Steller's jay	0.1			0.2	TR
Black-billed magpie	0.1				TR
Common raven	6.8	0.6	0.3	3.4	2.5
Common crow	0.5	1.0	1.9	7.5	1.9
Clark's nutcracker				0.1	TR
Black-capped chickadee	1.2	0.5	0.5	2.1	0.9
Mountain chickadee	0.7	0.3	0.1	0.2	0.3
Parus spp.	1.9	2.0	0.5		1.3
Red-breasted nuthatch	0.3	0.3	0.1	0.1	0.2
Brown creeper	0.1			0.1	TR
Dipper	0.3	0.1	0.1	0.3	0.2
Gray catbird		0.1	0.2		0.1
American robin		2.5	1.0		1.1

Appendix Table 1. (continued)

	Winter (2129)1/	Spring (2677)1/	Summer (2357)1/	Fall (912)1/	Total (8075)
Varied thrush		0.5			0.2
Swainson's thrush			1.2		0.3
Veery			0.1		TR
Mountain bluebird		0.1			TR
Townsend's solitaire	0.1		0.1		TR
Golden-crowned kinglet	0.4	0.1	0.7	1.1	0.5
Bohemian waxwing	5.2				1.4
Cedar waxwing			1.4		0.4
Northern shrike	0.1		0.7		0.2
Starling		0.1	0.8		0.3
Red-eyed vireo		0.2			TR
Tennessee warbler		0.1			TR
Yellow warbler		0.5	0.7		0.4
Yellow-rumped warbler		0.2	0.2		0.1
Townsend's warbler		0.1			TR
Macgillivray's warbler		0.2	0.1		0.1
Common yellow throat			0.1		TR
American redstart		0.4	1.2		0.5
Red-winged blackbird		0.1	0.2		0.1
Brown-headed cowbird		0.2	0.6		0.3
Western tanager		0.1	0.3		0.1
Black-headed grosbeak		0.3	0.1		0.1
Lazuli bunting		0.1			TR
Evening grosbeak			0.1		TR
Cassin's finch		0.1			TR
Pine grosbeak		0.1			TR
Pine siskin	24.1	21.1	1.9		13.9
Red crossbill	0.6	0.1			0.2
Rufous-sided towhee		0.1			TR
Dark-eyed junco	0.8	0.6	1.2		0.8
Chipping sparrow		0.2	0.7		0.2
Song sparrow	1.0	0.9	1.5	1.3	1.2

1/ Total number birds observed during each season

Appendix Table 2. Information concerning Canada goose observations on the Kootenai River between Libby Dam and Libby.

Date	Observation Type[1]	Location River Mile	River Section[2]	Composition[3]	Habitat Use	Age of Broods
2/22	FW	212.5	3	4A	river edge(bank)	
2/22	FW	212.5	3	7A	river edge(bank)	
2/22	FW	213.4	3	4A	gravel area	
2/22	FW	213.4	3	6A	gravel area	
2/23	G	211.6	3	2A	gravel area	
3/9	H	211.8	3	2A	gravel area	
3/9	H	211.6	3	2A	gravel area	
3/9	H	211.5	3	2A	gravel area	
3/9	H	211.0	3	2A	gravel area	
3/9	H	211.1	3	1A	flying over water	
3/9	H	211.4	3	2A	gravel area	
3/9	G	211	3	3A	river edge(bank)	
3/13	G	215.7	1	4A	gravel area	
3/14	G	209.8	3	2A	flying over water	
3/15	G	209.8	3	2A	flying over water	
3/15	G	211.5	3	2A	flying over water	
4/5	FW	216.0	1	1A	gravel area	
4/5	FW	213.1	3	2A	river edge(gravel)	
4/5	FW	212.3	3	2A	gravel area	
4/5	G	206.4	5	1A	gravel area	
4/5	G	217.0	1	2A	gravel area	
4/5	G	217.5	1	1A	in water	
4/6	G	215.7	1	2A	gravel area	
4/7	G	210.5	3	1A	flying over water	
4/7	G	212.0	3	2A	river edge(bank)	
4/8	G	212.0	3	1A	gravel area	
4/9	G	216.4	1	4A	gravel area	
4/9	G	218.0	1	1A	gravel area	
4/12	FW	204.4	5	3A	gravel area	
4/12	FW	212.2	3	2A	in water	
4/12	FW	217.0	3	2A	gravel area	
4/12	FW	210.8	1	2A	in water	
4/12	FW	204.4	5	1A	gravel area	
4/13	G	209.5	3	2A	in water	
5/3	G	217.8	1	2A &4Y	gravel area	8-12 days old
5/3	G	206.7	5	2A	gravel area	
5/4	G	217.8	1	4A & 4Y	gravel area	8-12 days old
5/4	G	217.0	1	2A	flying over water	
5/4	H	218.0	1	2A	gravel area	
5/4	H	217.7	1	2A	river edge(gravel)	

Appendix Table 2. (continued)

Date	Observation Type[1]	Location River Mile	River Section[2]	Composition[3]	Habitat Use	Age of Broods
5/4	H	216.3	1	1A	river edge(bank)	
5/4	H	211.9	3	3A	gravel area	
5/4	H	211.8	3	2A,2Y	gravel area	8-12 days old
5/4	H	211.7	3	1A	gravel	
5/4	H	207.9	4	1A	river edge(bank)	
5/4	H	211.1	3	1A	in water	
5/5	G	216.3	1	2A	in water	
5/7	G	211.8	3	2A	gravel area	
5/7	G	211.7	3	3A	gravel area	
5/8	G	209.8	3	2A	flying over water	
5/8	G	217.5	1	2A	in water	
5/8	G	217.5	1	1 egg[5]	base of tree on island	
5/8	G	Fisher R[4]	-	3A	flying over water	
5/10	G	Fisher R[4]	-	1A	landed in snag	
5/10	G	217.4	1	9A's	gravel area	
5/10	G	217.0	1	2A	in water	
5/10	G	217.0	1	1A	in water	
5/10	G	217.0	1	1A	river edge(bank)	
5/23	G	210.8	3	3A	gravel area	
5/23	G	210.5	3	7A	gravel area	
5/23	G	217.8	1	2A	gravel area	
5/23	G	217.8	1	2A,2Y	gravel area	21-28 days old
5/23	G	217.0	1	2A	gravel area	
6/7	G	215.4	2	2A,2Y	river edge(gravel)	14-21 days old
6/7	G	215.4	2	2A,8Y	river edge(gravel)	28-35 days old
6/7	G	215.4	2	2A,7Y	river edge(gravel)	40-49 days old
6/7	G	215.4	2	2A,6Y	river edge(gravel)	28-35 days old
6/7	G	215.4	2	2A	river edge(gravel)	
6/11	H	207.5	4	1A	flying over water	
6/11	H	204.7	5	1A	river edge(gravel)	
6/11	H	203.4	5	1A	river edge(gravel)	
6/12	G	217.8	1	7Y	gravel area	28-35 days old
6/14	JB	217.0	1	33T	gravel area	
6/23	G	218.0	1	4U	in water	
7/16	G	217.8	1	8T	gravel area	
7/19	JB	217.0	1	10T	in water	
7/19	JB	218.5	1	14T	in water	
7/19	JB	218.7	1	13T	gravel area	
7/21	G	215.6	1	21T	gravel area	
7/24	G	210.7	3	25T	gravel area	

Appendix Table 2. (continued)

Date	Observation Type1/	Location River Mile	River Section2/	Composition3/	Habitat Use	Age of Broods
8/21	JB	215.6	1	1U	gravel area	
9/20	JB	211.4	3	1U	gravel area	
9/20	JB	204.5	5	1U	river edge(gravel)	
9/26	FW	204.5	5	3U	in water	
10/12	G	209.7	3	6U	flying over water	
2/7/80	G	213.2	3	5U	in water	

1/ Observation type: FW (fixed-wing aircraft); G (Ground reconnaissance); H (helicopter survey); JB (jet boat survey)

2/ River section: 1 (RM 218.8-216.6); 2 (RM 216.6-214.7); 3 (RM 214.7-208.9); 4 (RM 208.9-206.9); 5 (RM 206.9-201.8)

3/ Composition: A (adult); Y (young of year); T (combined total of young & adults); U (unclassified)

4/ Fisher River - 1.8 miles upstream from mouth

5/ Remnants of destroyed or abandoned nest; evidence of serveral other eggs also found

Appendix Table 3. Species composition and relative abundance of birds observed during 2 surveys on each of 5 transects during winter on the Libby reregulation dam study area.

Species	Transects Combined		Coniferous North Slope		Coniferous South Slope		Coniferous Bottomland		Deciduous Bottomland		Mixed Coniferous-Deciduous Bottomland	
	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition
Common goldeneye	1.0	8.5					3.3	39.2	1.1	1.3		
Common merganser	0.7	1.2					0.6	0.5	3.3	4.3	0.6	2.0
Mallard	1.8	6.4			0.7	0.4	3.9	21.1	1.1	6.0	2.5	11.2
Golden eagle	0.3	0.2							1.1	0.4		
Bald eagle	1.0	1.0	3.5	2.1			1.7	1.6	1.1	0.4		
Great horned owl	0.3	0.2	0.7	0.4	0.7	0.4					0.6	1.0
Ruffed grouse	0.6	0.4			0.7	0.4	1.1	1.0	1.1	0.4		
Mourning dove	0.6	10.0	2.8	43.9								
Common flicker	0.1	0.1			0.7	0.4						
Hairy woodpecker	0.1	0.1							1.1	0.4		
Pileated woodpecker	0.3	0.2							1.1	0.4	0.6	1.0
Black-billed magpie	0.1	0.1					0.6	0.5				
Steller's jay	0.1	0.2									0.6	2.0
Common raven	3.4	3.9	4.2	4.6	3.0	1.8	5.0	6.7	4.4	4.3	0.6	2.0
Common crow	0.9	1.0	1.4	2.5	1.5	0.7			1.1	0.4	0.6	1.0
Black-capped chickadee	1.1	2.2	0.7	0.8	2.2	3.5	1.7	5.2			0.6	1.0
Mountain chickadee	0.3	0.9	0.7	2.1	0.7	1.4						
Parus spp.	2.0	3.5	2.8	5.4	3.0	3.5	1.1	3.6	1.1	0.4	1.9	6.1
Red-breasted nuthatch	0.6	0.5	0.7	0.4	0.7	0.7	1.1	1.0			0.6	1.0
Brown creeper	0.4	0.3			0.7	0.4	1.1	1.0				
Dipper	0.3	0.3					0.6	0.5			0.6	3.1
Bohemian waxwing	0.3	10.5							2.2	47.4		
Northern shrike	0.1	0.1					0.6	0.5				
Townsend's solitaire	0.1	0.1					0.6	0.5				
Red crossbill	0.6	1.2	1.4	4.2	0.7	0.7	0.6	0.5				
Dark-eyed junco	0.4	1.6	2.1	7.1								
Golden-crowned kinglet	0.7	0.8					1.7	3.1			1.2	2.0
Pine siskin	2.7	44.0	2.8	26.4	5.2	86.0	0.6	10.3	4.4	29.7	1.9	65.3
Song sparrow	1.0	1.5					0.6	3.1	5.6	3.9	0.6	1.0

Appendix Table 4. Species composition and relative abundance of birds observed during 5 surveys on each of 5 transects during spring on the Libby reregulation dam study area.

Species	Transects Combined		Coniferous North Slope		Coniferous South Slope		Coniferous Bottomland		Deciduous Bottomland		Mixed Coniferous-Deciduous Bottomland	
	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition
Great blue heron	0.2	0.3					0.8	0.7				
Canada goose	0.6	1.6					1.3	2.8			1.4	2.7
Mallard	0.9	11.8					2.9	30.2			0.5	0.5
Blue-winged teal	0.2	0.2					0.8	0.4				
Lesser scaup	0.1	0.2					0.4	0.4				
Common goldeneye	0.1	3.3					0.4	8.6				
Common merganser	0.2	0.7					0.4	0.7			0.5	2.3
Red-tailed hawk	0.2	0.2	0.5	0.6					0.8	0.7		
Bald eagle	0.4	0.4					1.3	0.9	0.8	0.7		
Ruffed grouse	1.9	1.8	0.5	0.6	5.6	6.2			1.7	1.4	2.3	3.2
Killdeer	0.5	1.1					2.1	2.8				
Spotted sandpiper	0.1	0.3					0.4	0.9				
Mourning dove	0.5	1.8	2.1	11.4					0.8	0.7		
Rufous hummingbird	0.3	0.3					0.8	0.4			0.5	0.5
Belted kingfisher	0.1	0.1									0.5	0.5
Common flicker	0.7	0.6	0.5	0.6			0.4	0.2	1.7	1.4	2.3	1.4
Yellow-bellied sapsucker	0.4	0.4							0.8	0.7	2.3	1.8
Hairy woodpecker	0.3	0.3					1.3	0.7				
Downy woodpecker	0.3	0.3							0.8	0.7	0.9	0.9
Eastern kingbird	0.2	0.2									0.9	0.9
Flycatcher	2.1	2.1	0.5	0.6	1.1	1.0	3.8	2.8	0.8	0.8	3.2	3.6
Violet-green swallow	0.1	0.1							0.8	0.7		
Rough-winged swallow	0.2	0.3					0.4	0.2	0.8	1.4		
Common raven	1.3	1.3	1.1	2.3	2.2	2.1	1.3	0.9	1.7	2.1	0.5	0.5
Common crow	1.8	2.1	4.2	5.7	0.6	0.5	2.5	2.6	0.8	0.7	0.5	0.5
Black-capped chickadee	0.7	1.2	1.1	1.7	1.1	1.6	0.8	1.3			0.5	0.9
Mountain chickadee	0.3	0.7	0.5	2.3							0.9	1.8
Parus spp.	2.5	4.4	0.5	1.7	5.0	8.3	1.3	2.6	2.5	4.1	3.7	7.2
Red-breasted nuthatch	0.7	0.8	1.6	2.3			0.8	0.4	0.8	1.4	0.5	0.5

Appendix Table 4. (continued)

Species	Transects Combined		Coniferous North Slope		Coniferous South Slope		Coniferous Bottomland		Deciduous Bottomland		Mixed Coniferous-Deciduous Bottomland	
	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition
Dipper	0.1	0.1					0.4	0.2				
Gray catbird	0.1	0.1							0.8	0.7		
American robin	3.9	4.7	4.2	6.3	2.2	2.1	3.8	4.3	8.3	9.0	2.8	3.6
Varied thrush	1.1	1.0	2.1	2.8	2.3	2.6	0.4	0.4				
Mountain bluebird	0.2	0.2							0.8	0.7	0.5	0.5
Golden-crowned kinglet	0.3	0.3					0.8	0.4			0.5	0.5
Starling	0.2	0.3							1.7	2.1		
Red-eyed vireo	0.4	0.3					0.4	0.2	2.5	2.1		
Tennessee warbler	0.1	0.1			0.6	0.5						
Yellow warbler	1.4	1.2					1.7	0.9	6.7	6.2	0.5	0.5
Yellow-rumped warbler	0.6	0.6	0.5	1.1	0.6	0.5	1.3	0.6	0.8	0.7		
Townsend's warbler	0.1	0.1	0.5	0.6								
Macgillivery warbler	0.4	0.3					0.4	0.2	2.5	2.1		
American redstart	1.1	0.9	0.5	0.6			0.8	0.4	4.2	4.1	0.9	0.9
Red-winged blackbird	0.2	0.2									0.9	0.9
Brown-headed cowbird	0.3	0.5	0.5	0.6			0.4	1.7	0.8	0.7		
Western tanager	0.1	0.1							0.8	0.7		
Black-headed grosbeak	0.5	0.7							3.3	4.8	0.5	0.5
Lazuli bunting	0.1	0.1							0.8	0.7		
Cassins' finch	0.1	0.2					0.4	0.4				
Pine grosbeak	0.2	0.3	0.5	0.6					0.8	1.4		
Pine siskin	8.6	46.4	5.3	52.3	11.1	70.0	11.3	28.7	10.0	41.4	5.6	61.3
Red crossbill	0.2	0.3			1.1	1.6						
Dark-eyed junco	1.2	1.3	2.1	3.4	2.8	3.1			1.7	2.1		
Chipping sparrow	0.3	0.3	1.6	2.3								
Song sparrow	1.3	1.5					1.7	1.7	2.5	3.5	2.3	2.3

Appendix Table 5. Species composition and relative abundance of birds observed during 3 surveys on each of 5 transects during summer on the Libby reregulation dam study area.

Species	Transects Combined		Coniferous North Slope		Coniferous South Slope		Coniferous Bottomland		Deciduous Bottomland		Mixed Coniferous-Deciduous Bottomland	
	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition
Great blue heron	0.1	0.2					0.6	0.5				
Mallard	1.3	6.9					5.0	21.6				
Common merganser	0.6	4.4					1.7	8.8	1.1	8.8		
Red-tailed hawk	0.7	1.0	0.7	1.4			1.7	1.6			0.6	1.2
American kestrel	0.1	0.2							1.1	0.9		
Ruffed grouse	0.9	1.0			0.7	1.4			1.1	0.9	2.5	4.8
Killdeer	0.4	1.6					1.1	3.1	1.1	3.5		
Spotted sandpiper	0.4	1.3					1.1	2.1	1.1	3.5		
California gull	0.1	0.5							1.1	2.6		
Mourning dove	1.1	11.7	3.5	47.6					3.3	2.6		
Great horned owl	0.3	0.3	0.7	0.7					1.1	0.9		
Vaux's swift	0.3	0.3							2.2	1.8		
Rufous hummingbird	0.9	1.0	0.7	0.7			1.7	1.6			1.2	2.4
Belted kingfisher	0.1	0.2					0.6	0.5				
Common flicker	1.1	1.3			0.7	1.4	1.7	1.6	3.3	2.6	0.6	1.2
Pileated woodpecker	0.1	0.2			0.7	1.4						
Yellow-bellied sapsucker	0.9	1.0					1.7	1.6			1.9	3.6
Hairy woodpecker	0.1	0.2									0.6	1.2
Downy woodpecker	0.6	0.7							3.3	2.6	0.6	1.2
Eastern kingbird	0.9	1.2					1.1	1.0	3.3	2.6	0.6	2.4
Flycatcher	4.7	5.4	2.1	2.1	8.1	14.9	5.6	5.2	3.3	2.6	3.7	7.1
Violet-green swallow	0.7	0.8					2.8	2.6				
Rough-winged swallow	0.1	0.2							1.1	0.9		
Barn swallow	0.1	1.0					0.6	3.1				
Gray jay	0.1	0.2	0.7	0.7								
Common raven	0.4	0.8							2.2	3.5	0.6	1.2
Common crow	1.7	2.6	4.2	4.9	1.5	4.1	1.7	2.6	1.1	0.9		
Black-capped chickadee	0.7	1.8	1.1	5.6	0.7	1.4	1.1	1.0				
Mountain chickadee	0.1	0.5	0.7	2.1								
Parus spp.	1.4	1.8	0.7	0.7	0.7	1.4	2.2	2.6	1.1	0.9	1.9	3.6
Red-breasted nuthatch	0.1	0.2										
Gray catbird	0.4	0.5			0.7	1.4			3.3	2.6		
American robin	2.7	3.6	1.4	1.4	1.5	2.7	4.4	5.2	5.6	5.3	1.2	2.4

Appendix Table 5. (continued)

Species	Transects Combined		Coniferous North Slope		Coniferous South Slope		Coniferous Bottomland		Deciduous Bottomland		Mixed Coniferous-Deciduous Bottomland	
	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition
Swainson's thrush	3.8	4.4	3.5	3.5	3.0	5.4	2.2	2.1	5.6	4.4	5.6	10.7
Veery	0.1	0.2							1.1	0.9		
Townsend's solitaire	0.1	0.2	0.7	0.7								
Golden-crowned kinglet	1.8	2.8			0.7	6.8	2.2	2.1	2.2	1.8	3.7	7.1
Cedar waxwing	0.1	0.3					0.6	1.0				
Starling	0.3	2.5							2.2	13.2		
Red-eyed vireo	2.7	3.1					3.3	3.1	11.1	8.8	1.9	3.6
Yellow warbler	2.3	2.6					5.0	4.6	3.3	2.5	2.5	4.8
Yellow-rumped warbler	0.4	0.8			1.5	5.4					0.6	1.2
Macgillivary warbler	0.3	0.3							1.1	0.9	0.6	1.2
Common yellow-throat	0.1	0.2							1.1	0.9		
American redstart	3.5	4.4					6.7	6.2	7.8	6.1	3.7	9.5
Red-winged blackbird	0.3	0.7									1.2	4.8
Brown-headed cowbird	1.0	1.8	0.7	0.7	3.0	10.8	0.6	0.5			0.6	1.2
Western tanager	1.0	1.3			3.0	6.8	0.6	0.5	1.1	0.9	0.6	1.2
Brown-headed grosbeak	0.1	0.2							1.1	0.9		
Evening grosbeak	0.3	0.3					0.6	0.5	1.1	0.9		
Pine siskin	3.1	7.2	5.6	8.4	4.4	17.6	2.8	4.1	1.1	4.4	1.2	7.1
Dark-eyed junco	3.0	4.1	7.0	9.8	8.1	14.9						
Chipping sparrow	1.1	2.5	3.5	9.1	1.5	2.7					0.6	1.2
Song sparrow	3.1	5.6					5.6	9.3	2.2	3.5	6.2	14.3

Appendix Table 6. Species composition and relative abundance of birds observed during 1 survey on each of 5 transects during fall on the Libby reregulation dam study area.

Species	Transects Combined		Coniferous North Slope		Coniferous South Slope		Coniferous Bottomland		Deciduous Bottomland		Mixed Coniferous-Deciduous Bottomland	
	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition	Percent Frequency of Occurrence	Percent Composition
Great blue heron	0.4	0.9					1.7	3.3				
Mallard	1.7	22.1					5.0	33.3			1.9	32.6
American wigeon	0.4	4.4					1.7	16.7				
Common merganser	0.4	2.7					1.7	18.0				
Golden eagle	0.4	0.9							3.3	4.8		
Bald eagle	0.4	1.8										
Ruffed grouse	1.3	3.5	2.1	28.6	2.2	11.1					1.9	4.4
Mourning dove	0.4	0.9	2.1	14.3					3.3	4.8		
Pileated woodpecker	1.3	2.7	2.1	14.3								
Yellow-bellied sapsucker	0.4	0.9					1.7	3.3	3.3	4.8		
Gray jay	0.4	0.9									1.9	2.2
Steller's jay	0.4	0.9									1.9	2.2
Common raven	3.4	11.5	2.1	28.6	2.2	11.1	3.3	6.7			1.9	2.2
Black-capped chickadee	3.4	16.8			4.4	22.2	3.3	10.0	6.7	28.6	7.4	17.4
Mountain chickadee	0.4	1.8									3.7	17.4
Brown creeper	0.9	1.8	2.1	14.3							1.9	4.4
Dipper	0.4	0.9					1.7	3.3				
Golden-crowned kinglet	1.3	8.9									1.9	2.2
Song sparrow	3.0	10.6			2.2	55.5					3.7	10.9
Killdeer	0.4	0.9					3.3	6.7	13.3	42.9	1.9	2.2
							1.7	3.3				
Belted kingfisher	1.3	2.7										
Goshawk	0.4	0.9							6.7	9.5	1.9	2.2
Red-breasted nuthatch	0.4	0.9							3.3	4.8		
							1.7	2.3				